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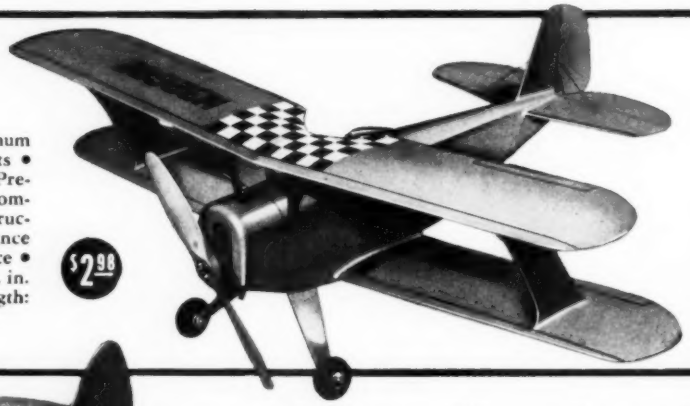

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OCTOBER 1950 VOL. XLIII—NO. 4

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By BILL WINTER

NATIONALS!

OF ALL the Nationals we have trekked to, the 19th, held at the Naval Air Station, Dallas, Texas, July 25 through 30, is one that will not be forgotten. It was a strange Nationals, turned topsy-turvy by the Korean war and weather, beset by bad breaks, yet a success. Any of the veteran contest directors who managed the various events will tell you they don't know how it was done—but done it was.

There almost wasn't a Nationals. Even while the boys—and old men—were en route from all corners of the country, all Naval bases had been ordered secured. Only Dallas was not secured. If the Nationals date had been just a few days later, there could not have been a meet. As it was, early arrivals were forced to camp outside for two full days due to mobilization on the base. Mix a National Model Airplane Meet with the activities of a major base going full blast and you have a hundred and one problems, almost any one of which could spell disaster to the contest. How can you get this into words? The Navy boys had their work to do, yet saw us through.

Some Nats impressions: No sooner had test flying begun, than one free flighter, nose in the sky, tumbled into the lake. A navy crash boat fished him out, then drifted helplessly off shore when the engine failed. An air force crash boat was delighted to rescue the sailors . . .. More eleventh hour building took place than at any other Nationals. Until the last day, you could see fellows joining side frames in the hangar workshop. Almost everyone had at least one ship to finish. The impact on Dallas was terrific. One female proprietor of a Motel went around wringing her hands. From every cabin window came the aroma of dope, on every carpet lay a covering of balsa shavings. Another lady was overheard on the telephone complaining that her cabins were filled with grown men playing with toy airplanes . . . Two biggest laughs of the meet were provided by Texas jack rabbits. Big enough to saddle and with huge ears a la Bugs Bunny, they'd pop out of the grass and dash madly through the very center of activity. The scream of gas engines so addled their wits that almost anything could happen. One zoomed across an open area, then tried to run into the prop of a big *Civy Boy*. During the tense moment of the carrier event, another Class D bunny appeared, running the length of the runway, hemmed in on both sides by the big Sunday crowd. What brought down the house, however, was the field mouse that took off after him . . .

Jim Walker tossing hand gliders. Two at a time. You place one atop the other, slightly forward, adjusted for tighter turn. The top model comes back first, then bottom model, landing one on top of the other in your hand. Walker told boy to stand still, feet apart. Then did outside and inside loops with gliders passing between the boy's knees and landing in Jim's hand. After one hard stunt, Walker stopped and strode away. Heard him muttering under his breath, "Better quit while you're ahead." Movie camera man asked him to throw a glider for a picture of it gliding. But the model went out of sight on a thermal . . . Dick Everett with a wierd tandem. Back wing had 80% plus area. Best glide of meet. Dick won a first in rubber fuse and stick . . . One of the K & B boys made tiny sheet pylon job with about 30 sq. in. area. With an .035 it climbed and flew at double the speed of any free flight at the meet. The experts' mouths hung open. One kit manufacturer got so excited he went home and within three days had the idea in production, steam-cambered wings and all. Certainly proves you *can* handle any power, conversely that most of us don't know what we are doing . . .

Joe Wagner, *Veco* designer of those sport free flight kits tried an *Arden .199* on 124 sq. in. Flew straight up. Takes a minute to fall. Had 18° left thrust and a timer string. Wagner tied to wrist and forgot. Launched ship. When last seen was trying desperately to untie knot while model tugged at other end, nose skyward, directly over his head.

On the second day it rained. In the early afternoon the good word went out. Meanwhile the most concentrated test session in history went on in front of the hangar. Hundreds of ships took the air. Stunt jobs, free flights, rubber models. You needed eyes in the back of your head. Models were gliding in by the dozens, from all directions. Some were not gliding. One, almost reaching the clouds with a stuck timer, turned over in the glide and came down in an almost vertical inverted spiral; so spectacular that all flying stopped. Free flight B and C was watched from behind a car. Crashes frequent and terrific. Jobs would hit the runway, leaving wings and tails and parts, then skitter along the concrete. Johnny Brodbeck said he had given away over $400 worth of parts, had three bags of broken engines and pieces.

Standout performance of the *Zeeks*. They get higher, faster, than anything yet concocted. Lew Mahieu, the designer, put one up so high that the boys were speechless. Some *Dooling 29* jobs looked as high after 20 secs. as many ships looked after 5 mins. in a thermal . . . George Perryman, Atlanta, three-time rubber record holder, has this "lost and found" sign on his ship: "I am a struggling young scientist. The loss of this model will impose a great hardship on me as I have a wife and three children to support. If found please notify, etc." Trouble is that everyone asks him if he is the scientist. To which he answers, "Nope, I'm his helper. Doc's over there." Then he grabs the model and walks away.

George Trammell, third in radio. Has both rudder and elevator control. Doing cross country he had just reached the one-quarter mile jeep when things began to happen. Zooms, dives, near snap rolls, turns, finally an inverted dive that folded the wings. Trammell sorting the pieces. "He'll rebuilt it," said the radio boys. Sure enough, late in the meet he made a terrific flight to come up to third. Foxworthy won with his lovely flying sport design which

(*Turn to page 36*)

FLASH—Just before press time, a note received from C. S. Rushbrooke, of the AEROMODELLER, informed us that Aarne Ellila (Finland) won the 1950 Wakefield Meet; second was Evans (Great Britain); third, Leardi (Italy).

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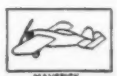

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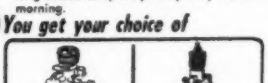

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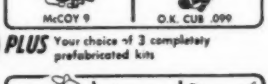

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SCOFFERS WHO condemned our jet fighters early in the Korean war were striking at a fundamental principle not only of aircraft design but all of life: you can't get something for nothing! There was nothing wrong with our jets, only with the way in which they were used. You cannot have a fast airplane and one that flies for a long time in the same package. At one end of the scale is the Lockheed P2V *Truculent Turtle*, which covered 11,235 miles in 55 hrs., 17 mins., or about 200 mph. On the other end is the Bell X-1, which covers about 40 miles in its 2-1/2 mins. burst of speed at 1,000 mph. You certainly wouldn't send the *Turtle* in to battle enemy jet fighters, nor the X-1 in to carry out a 10,000-mile bombing mission. The jet fighter's fundamental forte is its speed, much higher than that of any propeller-driven airplane. That means that for rising up, catching, and knocking down an enemy bomber it is superb and the jet fighter will always be most ideally suited to high-altitude interception missions. But the Korean war hasn't been a situation in which *anything* was "ideally suited." The Lockheed F-80 *Shooting Stars* were rushed into action because they were available near-by in Japan and because the Far Eastern Air Force wasn't very sure what our air units were going to meet in combat. With improvised long-range tip-tanks they have even surprised their scoffers by staying in action as long as one hour . . . which is as long as anybody would care to stay in sky battle, regardless of his airplane. For patrol work the North American F-51 and F-82 are ideally suited because of their long endurance (4 or 5 hours), but for that Sunday punch when it is needed, the F-80 can't be criticized. (As many, many Red Korean pilots (now six feet under) will attest.)

IT'S THE MARINE CORPS that will get the new Douglas A2D *Skyshark* and it appears ideal for the purpose. The Marines want a close air support airplane that is fast and can carry a heavy load of rockets, bombs and cannon, and that's just the specification around which the A2S was written. Powered by the big Allison T-40 turbo-prop engine of 5,500 hp, the A2D has a top speed that moves up close to the 500 mph-mark, and that's super-fast for beach-skimming, strafing runs, and pin-pointing of pillboxes and enemy strong points with napalm and demolition! And the low fuel consumption of the turbo-prop engine (actually better than a piston engine under ideal conditions) means that the A2D will have plenty of range for working over shorelines and inland strong points from carriers well at sea.

THE NATIONAL Advisory Committee for Aeronautics reveals that it now has a wind tunnel at its Ames Aeronautical Laboratory, Moffett Field, California, capable of testing at Mach number 8.0, or eight times the speed of sound! This tremendously high speed (more than 6,000 mph) is obtained by the trick of firing models into an oncoming supersonic air flow, so that the figure of eight is obtained by a combination of the two. The models are so tiny that they fit into the end of a .22-caliber rifle bullet—yet NACA insists that its delicate measuring equipment can actually obtain aerodynamic data on the model at these speeds!

BEFORE WORLD WAR II, we thought of Ethiopia as the land of black savages that tried to beat off Mussolini's army attacks with spears. That's why it's so hard to appreciate the fact that Ethiopia is buying two Convair *Liners*. The sleek transports are for Ethiopian Airlines and will cost $1,700,000. The purchase is being arranged through the Export-Import Bank and Airfleets, Inc., the Convair subsidiary that buys *Liners* from Convair and then sells or leases them to others. We just hope that those spear points don't tear the cabin upholstery!

EVER WONDER how many hours the average airliner puts in in a day? Oddly enough, the smaller the air line the harder-working the airplanes, with a few exceptions. Hardest-working airplanes in the United States are the Douglas DC-4 cargo planes of Northwest Airlines, which put in a 9½-hour day (wonder if they get overtime?). Longest daily times in passenger service is the four-engined craft of Eastern, Chicago & Southern and National Airlines (Connies and DC-6's) which average about 8-1/2 hours a day in actual operation. Softest life is lead by United's DC-6's, which work only about 3-1/2 hours a day!

THE OLD FORD *Tri-motor* keeps cropping up in the news, usually in an item about some individual somewhere digging one up and getting it into the air as a gag. But, "believe it or not," did you know that several Ford *Tri-motors* have been in

(*Turn to page* 53)

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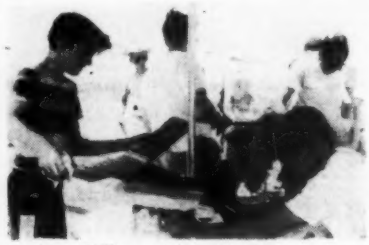
REPORT FROM THE WEST

by Jim Saftig

NATIONALS!

YOUR reporter was unable to make the Nationals this year, but Dick Everett gave us an eye witness account of this AAAA Meet.

It seems that the boys from the West will not be denied: Les Bartlett, San Diego youth, proceeded to cart home enough hardware to fill a small truck. Les is the new National Champion, and is only fifteen years old. We have had the opportunity of watching this Champ start at the bottom and make a rapid ascent to the top modeling spot in the nation. Les gained his title by winning the following places: 1st in outdoor cabin, 1st in Class B gas, 1st in Class C gas, 2nd in CO2, and 2nd in Class A gas. Denny "Hogan" Davis and Dick Everett, along with other members of the *San Diego Aeroneers*, have helped young Bartlett over some of the rough spots in his rise to fame. The continued guidance of the older modelers and the determination of Les Bartlett himself have proved an unbeatable combination. We might add at this point that

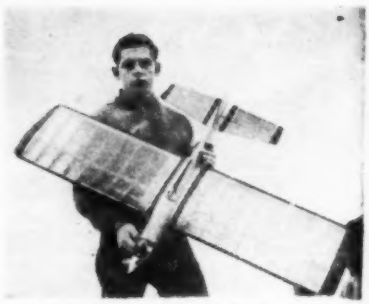


Jerry Phillips weighs a Sioux Cub .074 job; Haruo Hori checks the scales

Mr. and Mrs. Bartlett, Les' parents, gave the boy lots of encouragement, as he has had his moments of despair and disappointment along the "modeling road." Hearty congratulations Les, on a job well done.

The *Oakland Cloud Dusters* blew into Dallas and proceeded to go to work with their usual determination. Joe Foster had his hands full of ships most of the time and proceeded to make it known that he could fly them. Joe walked off with a 1st in B gas, 2nd in indoor hand-launch glider, 2nd in outdoor cabin, 2nd in indoor stick, 2nd in indoor cabin, and a 4th in outdoor stick. Carl Rambo, another of the Oakland "supermen," pulled down a 1st in indoor stick and a 5th in outdoor cabin. Joe Bilgri, also from the Oakland camp, took 1st in indoor cabin and 4th in indoor stick. These Oakland boys are surely an amazing group of "naturals." We have seen them in action several times and it has always been a great pleasure.

Charles Hallum, another of the fine rubber men, clicked to take the following places in Senior Class: 1st in outdoor stick, 1st in outdoor cabin, and 3rd in hand-launch glider. Dick Everett, another of the "sharpies," won a few "mugs" for himself by gathering in a 1st in outdoor cabin and stick respectively, and a 2nd in hand-launch glider. Denny Davis, frequent National competitor, took home a 1st in A gas, and a 3rd in C gas. Wally Short of San Bernardino, put in enough time with his A job to take a 2nd in the Open Class. Lew "Zeek" Mahieu picked



Larry Goodale holding *Zilch X* with which he won Sr. Sweepstakes at L. A.

up another record with his C speed job and took a 5th in A gas.

Bob Palmer placed 2nd in the stunt event. Dennis Alford, sensational seven-year-old stunt pilot, was plagued with fuel trouble, as was Lawrence Goodale. It seems that there were very few of the West Coast U-Control men at this big meet. In the scale event, Paul Gillian grabbed 1st, Bill Tharp 4th, and Bill Krecek 5th.

Altogether, the boys from the West tallied 13 firsts, 9 seconds, 2 thirds, 3 fourths, 3 fifths, and 2 sixths—a fine record.

We believe that we have listed all the winners, but if anyone has been left out, we'll pick them up in the next column.

The big news from the West in July was the Plymouth Eliminations that were held in various areas around Los Angeles. The free flight and outdoor rubber events were held at Cranford Airport, this being a last-minute change, and the day proved to be a modeler's "nightmare." The wind and dust sent many crates over the hill and into the deck. The times that were turned in were below par as weather conditions made good flights practically impossible. One of the busiest contestants on the field was little Richard Allen, a Freshman (as per Plymouth rules) from Los Angeles. Richard flew in outdoor and indoor rubber, free flight, and towline. In these events he accounted for three firsts and one second, and amassed enough points to take Freshman Sweepstakes and a trip to the Internationals at Detroit.

The U-control site was the Santa Anita parking lot in Arcadia. Activity was running at a very high pitch, and the spectators had a show that was well worth watching. Dick Grandel turned in a

(*Turn to page* 38)

Dick Grandel starts his *Dooling 60* just before flight of 153.78 mph

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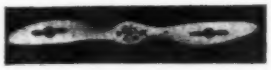

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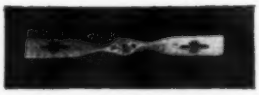

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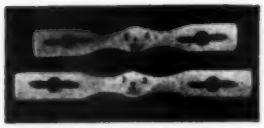

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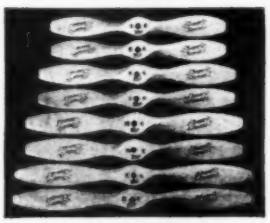

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NATIONALS! 1950

by HOWARD G. McENTEE

AS THIS is written, the Dallas Nationals has just become history. Over 900 contestants turned the Dallas Naval Air Station into a turmoil, and the associated headaches took at least ten years off the life of genial Johnny Clemens, the Contest Manager. The Texas weather man was not very kind to us. As John himself stated, "We sit around all morning in the rain, fly all afternoon, and figure winners all night!" Ironically, Tuesday, which was registration day, was really beautiful, with a hot sun and little wind. Wednesday, Thursday, and Friday all had their share of rain. Visitors felt a little better though after learning that some other areas of Texas had over 7" of rain in the same period that brought only about 2" to Dallas.

Saturday and Sunday were clear and hot, but as usual the fliers were grousing—this time it was wind! Said wind whipped the lake from which R.O.W. was flown into huge breakers (or so the R.O.W. boys said) and even seemed to blow the thermals away. Actually, some of the best thermals of the meet were observed early in the week. On Wednesday, after the worst of the storm had passed—but while it was still raining—several models on test hops were seen floating straight up to the clouds!

The speed boys, both in jet and I. C. engine classes, had some difficulty in adjusting their ships to the atmospheric conditions in Dallas, but after juggling and concocting all sorts of potent mixtures, they turned in some very creditable speeds, as seen in the results list.

While on the subject of controline flying, we may as well cover other C. L. events. Scale C. L., as usual, was of great interest to the spectators and some really beautiful ships were exhibited and flown. The new Navy Carrier event was also of interest, although the entry list was small. Now that the modelers have seen what can be done in this event, we believe more of them will try it. The Navy had provided a raised platform, as required in the rules, complete with arresting gear. The crowd was tense as the first entrant took off and made the prescribed number of laps. As his engine cut, he brought his ship down on the carrier deck. The hook caught momentarily in the gear and slowed the model

A.N. Editor and wife with R. C. entry

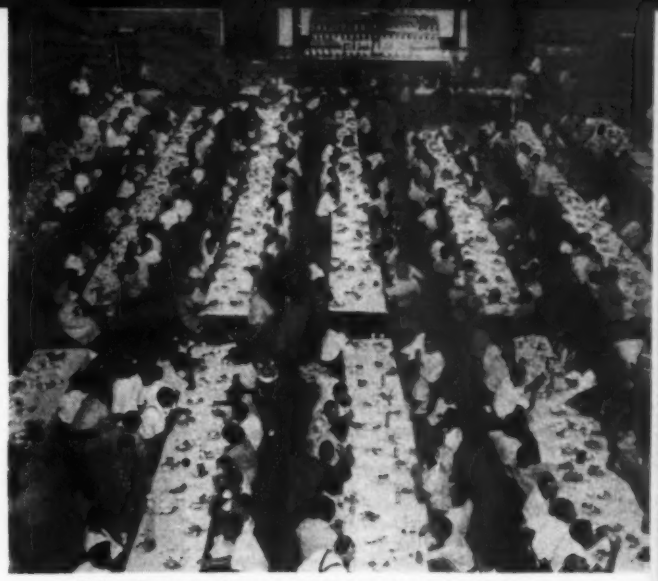
Ray Mathews and the Mrs. prepare PAA-winning Crowbar

Florida boys bring in a load of ship

½A PAA-Load winner Frank Ehling (right) and Bob Holland tune up

Sal Taibi launches his R.O.W. entry for an official flight

Nearly 1,000 contestants poured in and out gate at Dallas N.A.S.



Victory Banquet in Recreation Hall; awards are lined up on stage

considerably, but then snapped free and the plane flopped off the platform onto the runway; the judges ruled that it was "in the drink."

The next flier, Don McKercher, made a nice take-off, but before he had completed even one lap, his accurately detailed two-place ship crashed and was a total loss. The third flight turned out to be the winner. Cal Smith lifted his AD model off the deck quickly; after about ten laps, the arresting hook was released by a timer, and a two-speed motor control was used to slow the ship down sufficiently for a landing. The hook caught and held, and the model was brought to a quick stop right in the center of the flight deck.

The indoor events were held in the Will Rogers Coliseum at near-by Fort Worth. A large clear area was available, and some good times were turned in. The modelers, of course, were on hand early, and as the morning hours passed with no sign of the expected Navy timers, some of the indoor boys began to sound off in no uncertain terms. The timers arrived at about 10:30 a.m. and flying started soon after. We think it only fair to state that these timers had been up almost the entire night servicing several large flights of planes that were on their way to the Western Pacific. After only a few hours sleep, the timers were rushed to Fort Worth!

This is as good a place as any to state a few facts relative to Navy participation in the 19th Nationals. The first modelers to learn that something unusual was going on were those who arrived on Sunday—most of them couldn't even get in the field, and the few who did were put in temporary lodgings. Later on, it was found that Navy personnel that had been promised for such purposes as registration, timing, tabulation of results, etc., just wasn't to be had. Then many modelers found they couldn't get out on the field until 8:30 or 9:00 in the morning, and were shooed off promptly at 5 p.m. To those who had enjoyed the easy-going days at Olathe, where the field was open from dawn till dark, this was a blow. However, the meet hadn't gone on many days before it became apparent that the Navy—and Johnny Clemens and his helpers too—were doing a marvelous job, under the circumstances. We soon learned that personnel who had been briefed for work at the Nats, had been shipped out before the meet even started; jeeps that were supposed to have been used for model retrieving were gone. One had only to note the day and night loading of materiel on trains, the steady line of aircraft entering and leav-

U-Control scale F4U-4 of George Adams is admired by Navy fliers

Busy officials run ½A ships through processing

George Troster holds cabin ship while Jim Carpenter locks nose on

Dick Everett with his winning cabin rubber job after a 10-min. flight

Indoor events were held in this area

National Champ Leslie Bartlett, of San Diego

Nils Testor (left) presents Trophy to Howard Tomme

ing the field—from the minute the modelers vacated the field until they came back next day—to know the pressure the Navy was under in trying to carry out its job while still acting the part of gracious host. So please fellows, if some of you weren't treated like top brass (as you have been the last two years)—let's have no more gripes on this score!

As everyone expected, the ½A models were out in swarms, and they did extremely well too. There were even quite a few in the R. O. W. event. A ½A PAA-Load event was staged when quite a few modelers showed up with ships in this class and was won by Frank Ehling with the very respectable time of 13:16, highest of any of the PAA times.

The regular PAA-Load events were flown in the wind on Sunday, and as in other events flown that day, crashes were common. George Gardner, PAA-Load Director, told us of an unconfirmed rumor that he tried vainly to verify: it seems that a Class A PAA-Load ship crashed into the runway and was a total washout. The pilot was found dead and was promptly buried with honors. George scoured the field but was unable to find the tiny cross said to have been put over the grave!

Radio control, as usual, drew swarms of spectators. There were about 40 entrants, most of whom were on hand with their planes. Unfortunately, a majority of the R. C. boys spent the first day checking equipment, renewing old acquaintances, and studying the apparatus of other fliers. This was a bad mistake as the wind gave them a hard time right through to the end of the meet. Regardless of this, some of the more experienced R. C. fliers did very well, indeed. This meet marked the first Nationals appearance of Citizens Band equipment on both 465 mc. and 27 mc. That the 465 mc. equipment is a complete success may be judged from the fact that the R. C. winner, Gene Foxworthy, used it. Gene was one of the wise ones who piled up points early in the meet; the runners-up gained on him but were never quite able to close the gap.

The 27 mc. equipment mentioned above is that being tried out on an experimental license issued to the AMA. Second-place winner Jim Schenck used this transmitter, as did several other entrants. We understand that a total of six 27 mc. AMA transmitters have been authorized by the FCC, and will soon be working in various parts of the country. The availability of these transmitters, as well as the fact that the FCC has approved a 465 mc. unit, and changed its rules to make use of the latter legal for R. C. use, is expected to boost interest and activity in radio control work tremendously. Although the grade of R. C. flying at the 19th Nationals was not noticeably better than at Olathe last year, the fact that many more modelers can fly legally now, through use of Citizens Band equipment, is sure to give the impetus that

M.A.N. R.O.W. Trophy winners (l. to r.) Keith Kreigh, Collins-Hubbard team, Joe Foster

R. C. development has so long needed.

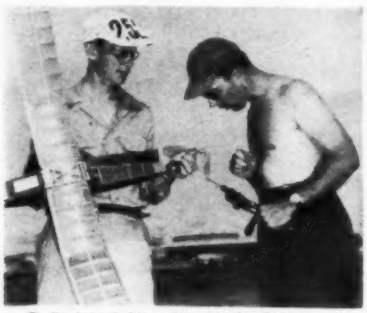
Flown coincident with the radio control event, was the new Navy event for bomb dropping by radio. This calls for an R. O. G. take-off (the shorter, the more points), dropping three bombs by radio, and landing *beyond* a given line. As with the Navy Carrier event mentioned earlier, the boys were a bit dubious of this one, and not many came prepared to try it. Even so, the bomb dropping was remarkably accurate, everything considered, and we believe more fliers will attempt it next time.

The famed Navy *Blue Angels*, flying their Grumman *Panther* jet planes, roared in Friday evening, with a brief preview of the show they were to put on Saturday and Sunday. Their coming had been well advertised, and many thousands of visitors poured into the Station on the week end to watch the precision jet flying. We learned that it was to be the last such exhibition for the *Angels*. From Dallas they headed direct for the West Coast and on to active duty in the Pacific.

Along with the model meet, the model industry held a trade show in the Navy Drill Hall. This marked the first time such a show had been held at a post-war Nationals, but there wasn't as much interest in it as expected. It seemed that the modelers spent every minute building, repairing, and flying, and had no time to spend at the show. In fact, they seemed to have no time for sleeping or eating either! A well-stocked hobby counter was set up in the Shop Hangar, and it was constantly besieged by frantic

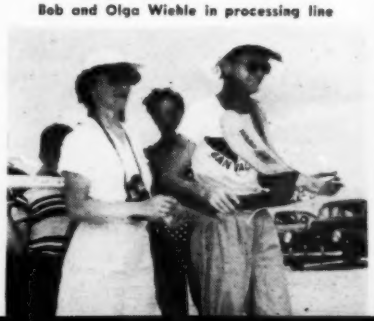
(*Turn to page* 44)

Bill Atwood launches ½A Wasp entry

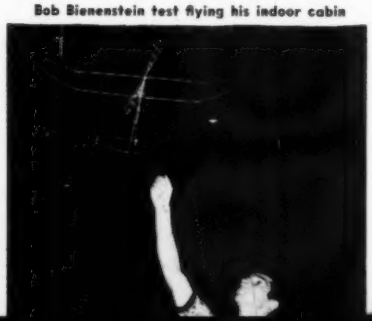


R. Dunham holds cabin ship for Ed Lidgard

Bob and Olga Wiehle in processing line



Bob Bienenstein test flying his indoor cabin



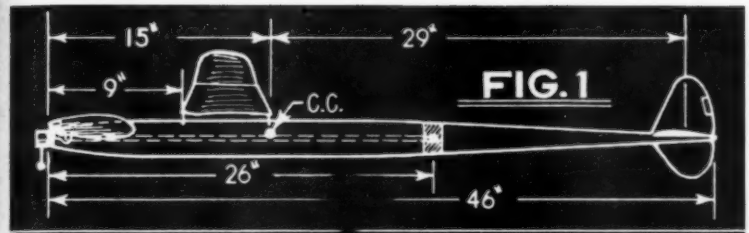


FIG. 1

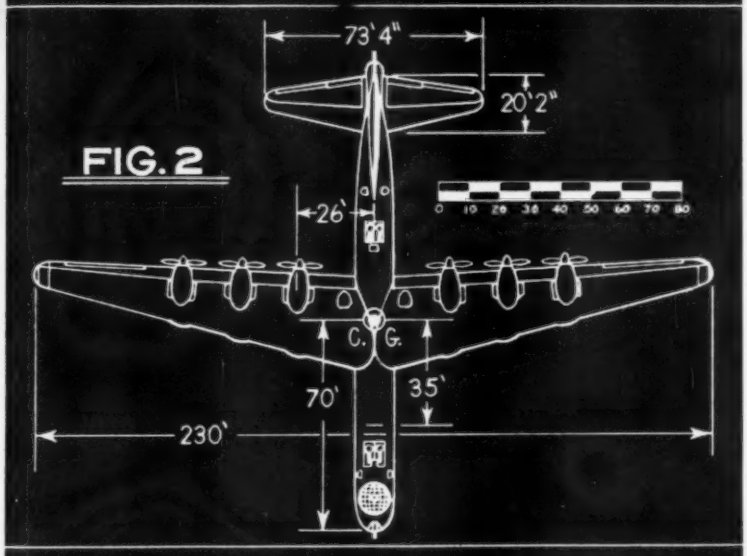


FIG. 2

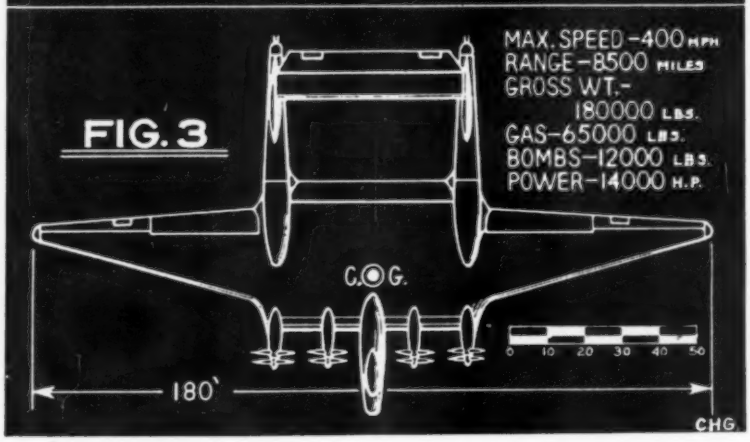


FIG. 3

DESIGN FORUM

by CHARLES H. GRANT

A VITAL feature of airplane design which has great influence on the flight characteristics of both models and full scale planes was briefly discussed in the July, 1950, issue—namely, the length of the nose of an airplane compared to its tail moment arm and wingspan. In that issue we discussed Jimmy Horlon's method of reducing the nose length of contest models. He has written us again, telling us of excellent results he has had with these short-nosed jobs. He says the glide is that of a good tow glider and disturbances are quickly overcome. When power ceases, the model recovers quickly and dips into a gentle glide. Fig. 1 shows his arrangement. He writes, "A short nose is possible because the length of the motor is only 26" while the length of the fuselage is 46". The center of weight of the motor therefore is well forward and allows a location of wing and stabilizer which provides a long moment arm but a very short-nose length. Actually the motor is 48" long but is suspended between hooks 26" apart. With this arrangement, a great many turns can be stored, approximately 1000."

The value of the short-nose length has been recognized for at least 30 years and the art during this time has consisted of designing airplanes from a structural standpoint that would have short-nose lengths without infringing upon power and efficiency. Mr. Horlon has solved this problem nicely with his arrangement. In fact, it is very similar, if not the same, as used on indoor models. These usually have a motor stick with a long boom extending rearward.

One other change may improve flight of this type of model and that is to increase the size of the propeller. This reduces the rate of rotation and the number of turns for any given distance traveled by the plane; an old trick used 40 years ago but still a good one. With a larger diameter propeller, more strands are required of course, and the motor will be capable of storing fewer turns. Nevertheless, the duration is practically proportional to the weight of rubber used even though the motor may be shorter with more strands. It will give greater duration provided there is a greater volume or weight of rubber. A larger propeller must be used to absorb the greater torque produced by this type of rubber motor. For instance, a 16" propeller usually is used on a 40" span model. The pitch of such a propeller averages between 22 and 24". Now if the propeller diameter is 20" instead of 16", the pitch may be 28 to 30", and its turning velocity may be reduced proportionally. In fact, the pitch diameter ratio may be increased as well as the diameter itself. Instead of 1.4 times the diameter, the pitch may be 1.6 or 1.67. The pitch of the 20" propeller then would be between 32 and 33" compared to 22 to 24" for the 16" diameter propeller. Speed of the propeller would be reduced one third, and the maximum number of turns on the motor could be reduced one third. We suggest that both the shorter motor and larger diameter propeller be used on contest models such as Mr. Horlon describes.

Mr. Horlon tells us that he "knows that the stabilizer area can be increased to increase the stability, instead of shortening the nose. However, in Wakefield contests the stabilizer area is limited to one third the wing area. Consequently, the most effective way of increasing the stability and recovery of the model during flight is to shorten the nose." This is absolutely true. However, there are limits of nose length that must be adhered to under various conditions. Several months ago (May, 1950) we gave a formula for stabilizer area as follows:

$$S_A = 0.2 \left[\frac{A(2C+N+D)}{M}\right].$$

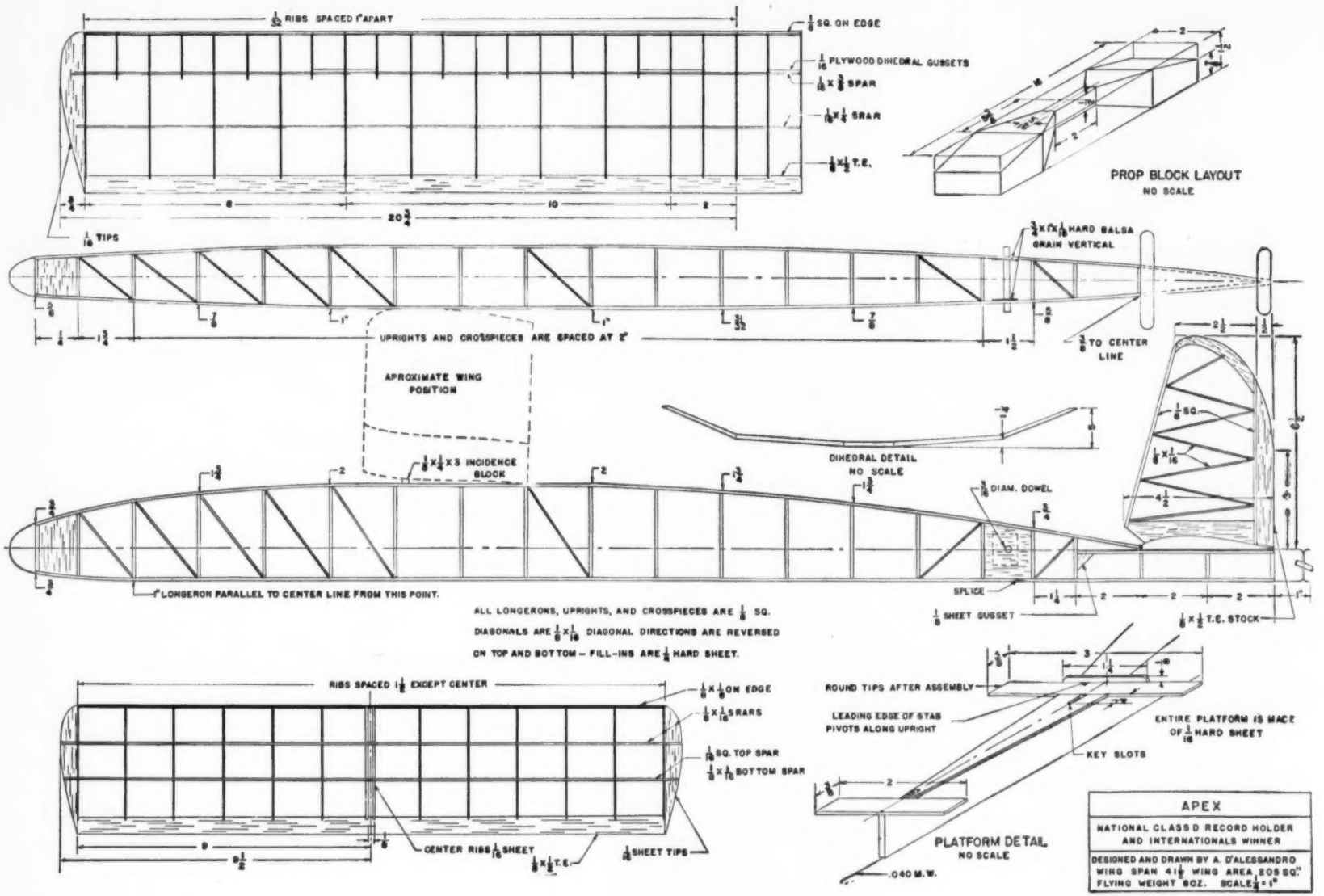
S = the minimum stabilizer area; A = wing area; C = wing chord or width; N = nose length (measured between the *center of gravity* and the rear face of the propeller); D = propeller diameter; M = tail moment arm (distance from the *center of gravity* to the center of stabilizer).

This formula may be rearranged as follows to determine the required length of the nose when the stabilizer area is one third of the wing area:

$$N = \left(\frac{S_A M}{0.2A}\right) - 2C - D.$$

Now, we have the problem of inserting the correct values to calculate the nose length. You will note in Fig. 1, that the C.G. is approximately at the trailing edge of the wing. Commonly the moment arm

(*Turn to page* 42)


1/32 RIBS SPACED 1" APART
1/8 SQ. ON EDGE
1/16 PLYWOOD DIHEDRAL GUSSETS
1/16 X 3/8 SPAR
1/16 X 1/4 SPAR
1/8 X 1/2 T.E.
1/16 TIPS
20 3/4
PROP BLOCK LAYOUT
NO SCALE
3/32 X 1/2 X 1/8 HARD BALSA GRAIN VERTICAL
UPRIGHTS AND CROSSPIECES ARE SPACED AT 2"
3/8 TO CENTER LINE
APROXIMATE WING POSITION
1/8 X 1/4 X 3 INCIDENCE BLOCK
DIHEDRAL DETAIL
NO SCALE
3/16 DIAM. DOWEL
1/8 SQ.
1/8 X 1/16
LONGERON PARALLEL TO CENTER LINE FROM THIS POINT.
SPLICE
1/8 SHEET GUSSET
1/8 X 1/2 T.E. STOCK
ALL LONGERONS, UPRIGHTS, AND CROSSPIECES ARE 1/8 SQ.
DIAGONALS ARE 1/8 X 1/16 DIAGONAL DIRECTIONS ARE REVERSED
ON TOP AND BOTTOM — FILL-INS ARE 1/16 HARD SHEET.
RIBS SPACED 1 1/2 EXCEPT CENTER
1/8 X 1/8 ON EDGE
1/8 X 1/16 SPARS
1/16 SQ. TOP SPAR
1/8 X 1/16 BOTTOM SPAR
CENTER RIBS 1/16 SHEET
1/8 X 1/2 T.E.
1/16 SHEET TIPS
ROUND TIPS AFTER ASSEMBLY
LEADING EDGE OF STAB PIVOTS ALONG UPRIGHT
KEY SLOTS
ENTIRE PLATFORM IS MADE OF 1/16 HARD SHEET
PLATFORM DETAIL
NO SCALE
.040 M.W.

APEX

NATIONAL CLASS D RECORD HOLDER AND INTERNATIONALS WINNER

DESIGNED AND DRAWN BY A. D'ALESSANDRO
WING SPAN 41 1/2 WING AREA 205 SQ."
FLYING WEIGHT 8OZ. SCALE 1/2" = 1"

The APEX

by ANTHONY d'ALESSANDRO

THE APEX represents two years of observation and experience in building and flying all types of rubber-powered models. It incorporates a longer-than-average fuselage, a fairly large stab, a long, powerful motor with an unusually designed propeller, and last, but not least, a dethermalizer!

Proof of the terrific combination of these features is the contest record of this ship. The model was hurriedly built and tested in June, 1949, and entered at the Millville, New Jersey, contest where it took first place. At Johnsville Air Station Meet, it took third place. At Detroit with ideal conditions (and Tony "Muscles" Becker on the business end of the winder), the model turned in 23.33 for first place and a new AMA record. Two weeks later at Pottstown, Pa., it won second place on two flights (second flight was 7 mins. O. O. S., the dethermalizer was set for 10) in spite of very windy weather.

Construction of the *Apex* is very simple and plans are practically self-explanatory so I would like to give a little of the background on this model touching lightly on anything which differs from standard procedure.

I caught the modeling bug after attending a meet early in 1948 and joined a club. Among the members I became acquainted with Abe Adler. Abe took one look at my models (?) and suggested a few afternoons of instruction on the finer points of building a contest plane. He taught me how to build with something approaching workmanship and our prop carving sessions turned my old clubs into efficient altitude-getters.

During that season I built a C job and flew it at several contests while Abe taught me the fine art of adjusting. It flew well and gave creditable performance but was easily lost O. O. S. on windy days. This was due to a fast glide and small size.

That winter and the early spring of 1949 I built and flew a 300 sq. in. job. The result was a ship that required a large amount of power (lots of manpower on the winder too!) for contest flying. The general size of the model made for transportation problems, and in an effort to keep the structural weight to a minimum, I found I had skimped *too much*. This resulted in structures that were easily broken in crack-ups or rough landings.

It was still early in the season, so I sat down and thought things out—I wanted a ship that was economical, simply built, not easily lost, fairly easy to transport, but with outstanding performance (tall order, huh?). I chose 205 sq. in. for the wing with an NACA-4612 airfoil. A modified Clark Y was used on the stab. Rectangular surfaces were chosen for speed and simplicity in building. False ribs were used on the wing to maintain accuracy.

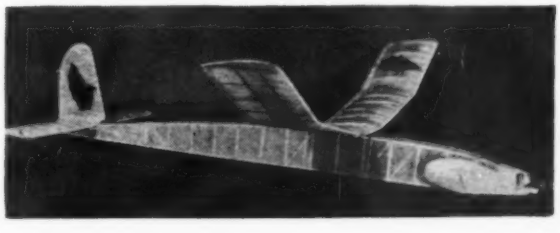
Multispar construction was used on the stab to prevent bowing and warping. Diagonal pieces were built into the rudder for the same reason.

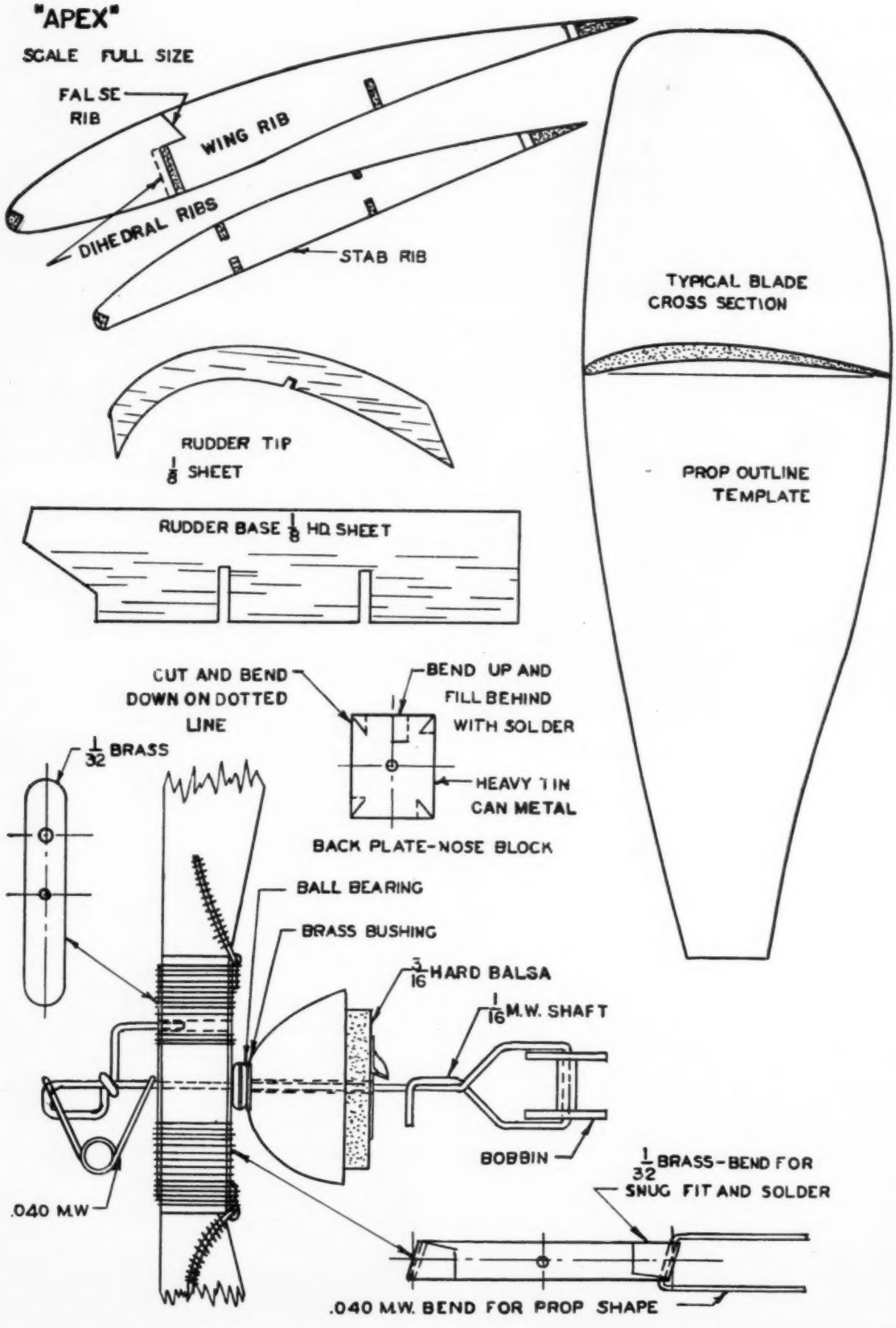
The fuselage is of standard design and construction because the author feels it can't be beaten for strength and ruggedness, considering the amount of structural weight involved. For the prop-power combination I again turned to my friend Abe Adler. We decided on a long powerful motor, (10" of slack) and for the prop, Abe whipped out his trusty slide rule (he's an engineer with Piasecki Helicopter Company) and went to work. After some high-powered mathematics, he came up with the layout shown on the plans. It features a medium pitch with a large amount of washout at the tips. Construction is as follows:

Fuselage. The sides are built directly over each other. The main longerons should be picked with an eye for uniformity in strength. In the assembly I used a cardboard template at the widest point of the fuselage for squareness. Fill-ins should be given several coats of glue, and after the stab platform and dethermalizer hook is glued in place, the entire fuselage should be given a second application of glue. The original noseblock is made of six laminations of hard 1/8" sheet. Reverse the grain direction of adjacent pieces. Carve and sand to the shape shown on the plans; a snug fit is essential. Sand the framework lightly and set aside.

Wing. Plywood or metal templates are used to cut all ribs. The front side of the trailing edge is blocked up with 1/32" scraps to maintain correct airfoil shape. The secondary spar also has to be blocked up for this reason. Dihedral should be measured on the trailing edge. Dihedral gussets are 1/16" plywood. Check all ribs for straightness and correct alignment. Give the framework a second coat of glue and sand leading edge and tips to shape. Sand lightly all over and set aside.

Tail Assembly. Stab and rudder are assembled in the same manner as the wing. Note that the two center ribs are 1/16" sheet. The rudder base fits between these. Pieces of 1/8" sheet should be temporarily inserted between them during assembly. Soft copper wire, dural, or aluminum is used as hinge material for attaching the tab to the rudder. Sand stab and rudder, rounding leading edges and tips. Glue dethermalizer hook on trailing edge of stab as indicated. Give second coat of glue to all joints and sand lightly. (*Turn to page* 41)




"APEX"
SCALE FULL SIZE
FALSE RIB
WING RIB
DIHEDRAL RIBS
STAB RIB
TYPICAL BLADE CROSS SECTION
PROP OUTLINE TEMPLATE
RUDDER TIP
1/8 SHEET
RUDDER BASE 1/8 HD. SHEET
CUT AND BEND DOWN ON DOTTED LINE
BEND UP AND FILL BEHIND WITH SOLDER
1/32 BRASS
HEAVY TIN CAN METAL
BACK PLATE-NOSE BLOCK
BALL BEARING
BRASS BUSHING
3/16 HARD BALSA
1/16 M.W. SHAFT
BOBBIN
1/32 BRASS-BEND FOR SNUG FIT AND SOLDER
.040 M.W
.040 M.W. BEND FOR PROP SHAPE

WORLD WAR I

SOPWITH PUP

by ROBERT C. HARE

Sopwith *Sea Pup* landing on H.M.S. Furious. Crew is reaching for straps to pull it down

IN Part One of our analysis of the Sopwith *Pup*, (August, 1950, M.A.N.) we discussed this interesting airplane's background and general design.

Sopwith Pup Performance. As crude as the *Pup* may have appeared when compared to the German types against which it fought, the over-all cleanliness of its design gave it a surprisingly high performance. In the following performance figures, those figures in parentheses indicate the 100 hp Gnome *Monosoupape Pup*; preceded by figures for the 80 hp Le Rhone *Pup*.

Top speed at sea level, with full military and fuel load was 108 mph (109 mph). This dropped off to 106.5 mph (107 mph) at 6,500′; 104.5 (104) at 10,000′; 94 (100) at 15,000′. Thus it can be seen that the 100 hp *Pup* had the advantage over its lower powered counterpart at altitudes around 15,000′ by at least 6% insofar as speed was concerned. The extra power also raised the ceiling from 17,500′ in the 80 hp model to 18,500′ in the 100 hp model.

Rate of climb figures are of interest also: it will be seen that the 80 hp *Pup*, with a lighter wing loading (but heavier power loading) held the advantage at first, but was outclassed by its huskier brother—climb to 6,500′ in 8 mins. (7.1 mins.); to 10,000′ in 14.4 mins. (12.4 mins.); and to 15,000′ in 30.1 mins. (23.4 mins.). This performance was based on an all-up weight of 1,225 lbs. for the 80 hp *Pup* and 1,297 lbs. for the 100 hp model. Their respective wing loadings were 4.8 and 5.2 lbs. sq. ft., and 14.6 and 12.4 lbs. hp for power load loadings.

Later production models of the *Pup*, principally used for training, flew with a total loaded weight of 1,313 lbs., had a top speed of 99 mph at 10,000′ altitude, climbed to 5,000′ in 7 mins. 40 secs., and to 10,000′ in 15 mins. 24 secs. This model also was equipped with an 80 hp Le Rhone, carried 18 gallons of gasoline and 5 gallons of oil.

All the *Pups* landed at 30 mph, which accounted for their ability to operate from small, rough temporary fields at the front, and made them particularly suitable as trainers in the hands of eager students.

On take-off, the *Pup* was flying in 100′ of ground run, and climbed at a steep angle at about 50 mph. A proper *Pup* take-off required a forward stick position to get the tail off the ground immediately, and a gentle back-pressure as flying speed was reached started the little fighter on its way up.

The *Pup* often was referred to as "the most delightful machine in the world to fly." That was because it was so beautifully balanced. In straight and level flight, the *Pup* was directionally stable up to about 12,000′, where the gyroscopic action of its rotary engine tended to cause it to hunt towards the right. Gyroscopic action also made the *Pup* very sensitive in a right-hand turn, but such a maneuver did not result in the spinning tendency inherent in the Sopwith *Camel*. A left-hand turn was only slightly resisted by gyroscopic action with the result that the *Pup* could be turned sharply right or left without undue concern or effort.

Lateral control was exceptional good because the ailerons were of generous area, and were located at the wingtips. The long tail moment arm made the *Pup's* elevators sensitive at all speeds, and the rudder had similar characteristics. These members tended to stiffen somewhat at high speed, but at no time required excessive effort to maneuver the ship.

Stall characteristics were very mild with a slight stabilizer buffet a little above 30 mph. The stalling angle was very high, which accounted for the *Pup's* low-landing speed.

On landing, the plane tended to float, especially in cold weather, but had no undesirable touch-down characteristics. The ship often bounced because of its high angle-of-attack at landing combined with the rather stiff action of its shock absorbing system. Taxing was made easy, even in gusty weather, because of the steerable tailskid.

Construction. Structure of the *Pup* was very light, as you can well imagine. Just think of a single-seat fighter with an empty weight of 787 lbs.! Take from that approximately 250 lbs. for the engine and propeller, and you get an air-frame weight of about 535 lbs.! In this respect it was a far cry from a modern single-seat fighter and the same, of course, can be said about the manner in which it was built.

The fuselage was made up of a bare frame consisting of four longerons and ten upright members (*Turn to page* 38)

•• PART TWO ••

This 100-hp *Pup* is in full war paint, right from the factory

Two Australian *Pups* at a training field in France

FIG. 1. 60 OUNCE GROSS, 56 IN SPAN, ARDEN .09, 666 OZ. POWER LOADING, 18 OZ. WING LOADING, POWERMIST, TORNADO 10-4 SPORT

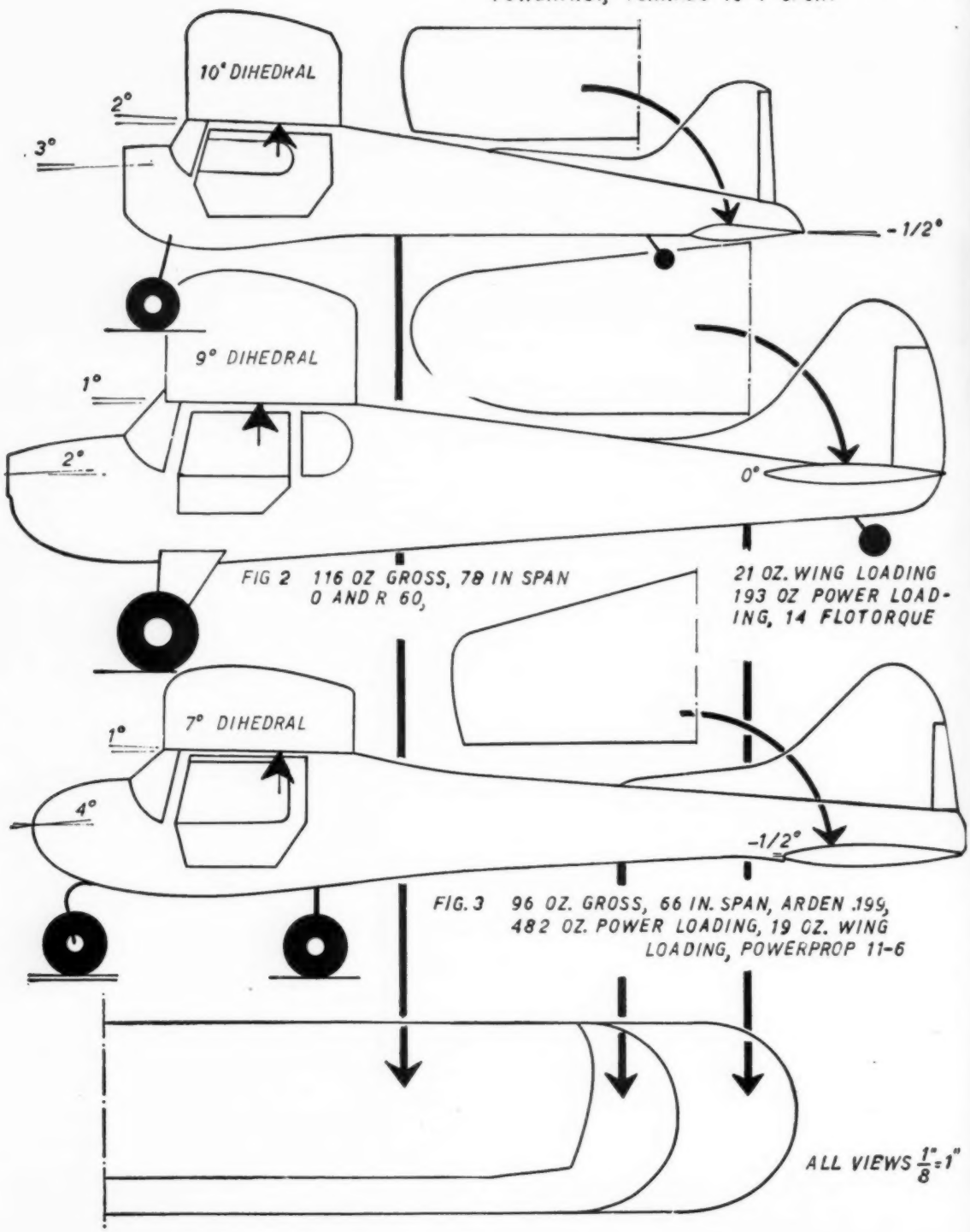


FIG 2 116 OZ GROSS, 78 IN SPAN O AND R 60, 21 OZ. WING LOADING 193 OZ POWER LOADING, 14 FLOTORQUE

FIG. 3 96 OZ. GROSS, 66 IN. SPAN, ARDEN .199, 482 OZ. POWER LOADING, 19 OZ. WING LOADING, POWERPROP 11-6

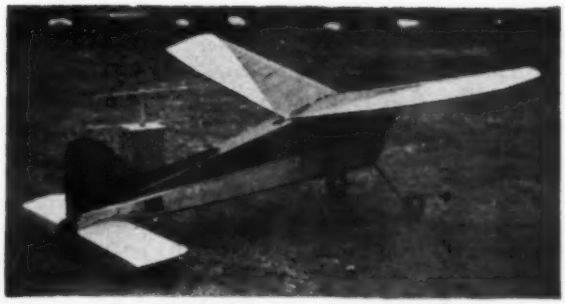
GOTTINGEN 549 AIRFOIL, RADIO GROSS 16 OZ.

This ship corresponds to Fig. 2 on facing page. Cal Smith is launching

Bill's newest R. C. ship (Fig. 3 on the drawings)

DESIGN OF RADIO CONTROL PLANES

by BILL WINTER



The old faithful *Citizen* has seen a lot of service

SOMEDAY soon the radio control movement may become a stampede. As this is written, the FCC has already given its blessing to one unit on the "license-free" Citizenship Band, although there is still some confusion as to who can use it. Another manufacturer has developed 27 mc. equipment, and the AMA and FCC are teamed for experimental field use on that band, with a view to possible license-free operation. Either on the market, or in experimental form, for possible commercial release are four different wave-length radios; one manufacturer has been formation flying two airplanes for the past six months. "Wireless" combat could be more than a pun!

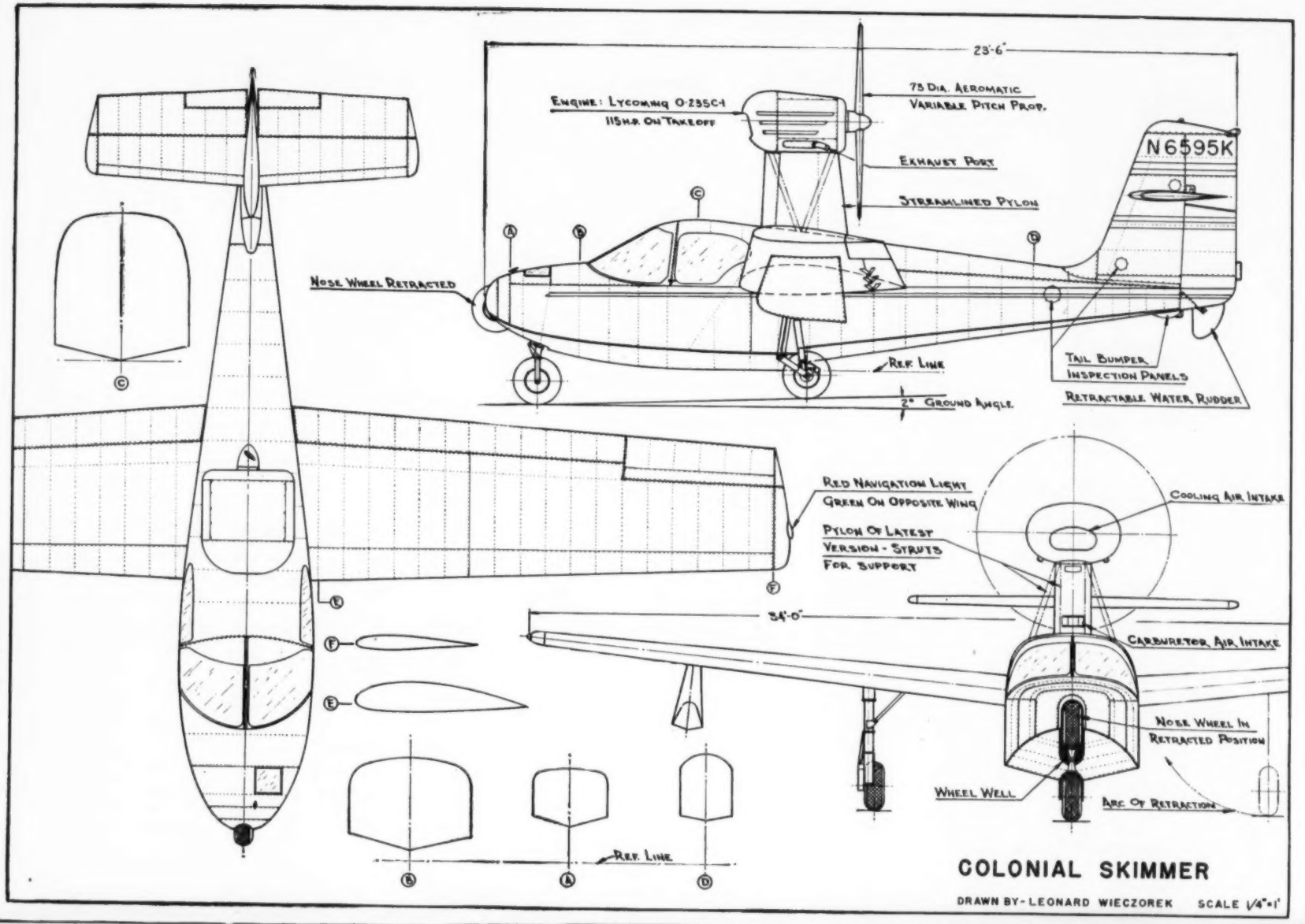
Yes, R.C. shows all signs of taking off for unknown but fascinating places. Bigger meets now have radio control events that beggar all but the last two Nationals. Trends are developing so that even the remarkable *Rudder Bug* is not all things to all men. Just as stunting and speed grew out of the *Fireball*, and the modern powerful, floating stylized pylons from the old *KG*, we'll surely see several sizes and specifications for R.C. jobs in the near future. Design compromises already make it tough for those who create their own ships; no longer can you have your cake and eat it too. Not only are you faced with a choice of size, but with a choice of performance.

For example, it is impossible—to date, at least—to build a plane that is ideal both for contest and sport flying. It may be some years before this is felt at meets in the hinterland but the writing is on the wall for big time competition. Take Jim Walker: with his stepped-position up-and-down flippers, right-and-left rudder, plus engine control, he requires reduced stability in order to maneuver fully. By changing wings and hooking up ailerons, he is able to roll. His loops are big and pretty, like those of a fighter plane. He is pushing development of his *Pozzippo* control units. The intricate maneuvers listed under the rules invite more complex radio, at higher costs, and will put a premium on knowledge of radio. The wonder is that a simple change in elevator setting hasn't run away, this far, from rudder only.

Your first radio control machine is usually built only so you can thrill to successful controlled flight. Immediately there is a dilemma. If you were concerned (as are most free flighters) with diving turns, inadvertent spirals, and other traditional dangers, you aimed at a plane having maximum stability. If the ship proved perfect, making turns without loss of altitude, it may have proved difficult or even impossible to spin. If you can't spin with rudder only, you can't perform a stall and you certainly never will loop. So if you get contest minded you begin to reduce stability by taking out dihedral, which permits the plane to really wind as it does in free flight, and by making other alterations.

At the last Mirror Meet the R.C. event was run off in a 25 mph wind with healthy gusts. The writer could not fly the plane shown in Fig. 1. This is the *Citizen*, (M.A.N., Feb. and March 1950) a small sport job intended for quick turns to avoid obstacles in poor local terrain; it was completely unfit for such windy-weather competition. *Rudder Bugs* didn't fare very well, some being blown a mile or more away despite full control of the radio, some slowly bucking the wind for a few gingerly maneuvers. Fran McElwee, though he did not win, got off a convincing long flight to high altitudes, boring readily up wind, yet making a prolonged nose-high-approach. His ship spanned 5', had a *McCoy 19* running on glow plug out of a Walker pressure tank—for steady running—and a 9-6 *Powerprop*. Despite a probable power loading of 300 oz. or so, and a wing loading of at least 16 oz., this ship had the highest performance of any R.C. job seen to date by the writer, excepting Walker's *Spitfire*-powered design. For serious contest work, allowance must be made for any wind, and designs will be affected accordingly.

What size ship should you build, how much area must it have, how heavy can it be, what power, what propeller, what proportions? If you can't design your (*Turn to page* 50)


23'-6"
75 DIA. AEROMATIC VARIABLE PITCH PROP.
ENGINE: LYCOMING O-235C-1 115 H.P. ON TAKEOFF
EXHAUST PORT
STREAMLINED PYLON
N6595K
NOSE WHEEL RETRACTED
REF. LINE
2° GROUND ANGLE
TAIL BUMPER
INSPECTION PANELS
RETRACTABLE WATER RUDDER
RED NAVIGATION LIGHT
GREEN ON OPPOSITE WING
PYLON OF LATEST VERSION - STRUTS FOR SUPPORT
COOLING AIR INTAKE
34'-0"
CARBURETOR AIR INTAKE
NOSE WHEEL IN RETRACTED POSITION
WHEEL WELL
ARC OF RETRACTION
REF. LINE
COLONIAL SKIMMER
DRAWN BY - LEONARD WIECZOREK
SCALE 1/4"=1'

DRAWN BY-LEONARD WIECZOREK SCALE 1/4"=1'

The *Skimmer* with late modifications coming in for a landing

Skimmer XC-1

by ROBERT McLARREN

WATER FLYING adds a third dimension to personal flying, but the added thrill and adventure of over-water operation is not its only advantage since it also adds utility and safety to the pleasure of flying.

None will deny that the progress of aviation is tied inextricably with the expansion of airports in this country. Government officials, personal aircraft manufacturers and plane owners have all spoken out for more and better airports and lay much of the frustration of private flying in this country at the door of a lack of modern, economical airports at the places people want to go. Airport people counter by pointing out the sizeable cost of airports, not only for construction but also upkeep and operation.

The water pilot can laugh at all these arguments! With his seaplane or amphibian, he has the world's longest runways at his disposal; runways that are always in good condition, that cost *nothing* to provide and *nothing* to maintain. And the little-known fact is that they are everywhere; usually at the very place you want to visit. Every lake, river, and bay in the nation is a first-class airport for the water flier. If your vacation desire is the mountains: there are lakes near-by. If you like the seashore, the ocean is your landing field. If it's fishing you want, the lake or cove of your preference is your airport and your fishing boat at one and the same time!

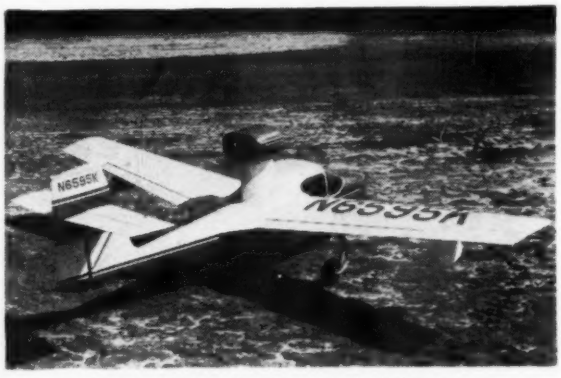
While the seaplane or float-equipped plane pilot enjoys all these privileges, it is the amphibian owner who possesses all the dimension of flight: the land, the water and the air. From his home airport he can operate as any other landplane but he can add to his scope the broad, cool expanses of bays and lakes that are death traps for the landplane—but home to the seaplane. And the amphibian can change itself from land to seaplane in mid-air!

The seaplane pilot need not confine himself to our seashores. A study of any map of the nation will reveal the astonishing fact that our supposedly land-locked interior is virtually sieved with lakes, rivers, and streams. Transcontinental flights are not only wholly practical but also have been made hundreds of times, by small amphibians as well as by large Navy flying boats, with frequent stops for fuel and rest. Take a glance at your home atlas and be surprised by our water-dotted interior.

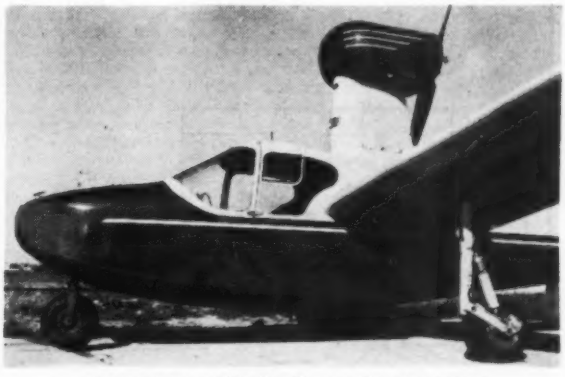
Naturally, not every water surface is a complete airport for the seaplane. When fuel and oil are required, minor repairs or storage, etc. then certain facilities are needed, attended by mechanics. But the amazing fact is that there are more than *four hundred* completely-equipped seaplane facilities across the United States! Some of these are quite simple, of course, but others are elaborate seaports with ramps, hangers, fuel and oil, spare parts, trained mechanics, restaurants and sleeping accommodations. Some have flood lights and "runway" buoys marked by lights for night operation. Others have crash boats, buoys for tying up in the water, radio communications, etc.

With virtually unlimited water areas dotting the nation and an ample supply of seaplane facilities, the call of the true flying sportsman is to the seaplane. Most of the personal aircraft currently in production are certificated for float installation and for the private pilot whose home or summer resort lies on a lake, or bay, and who desires to spend all of his time near the water; the float-equipped personal aircraft is ideal for his purpose.

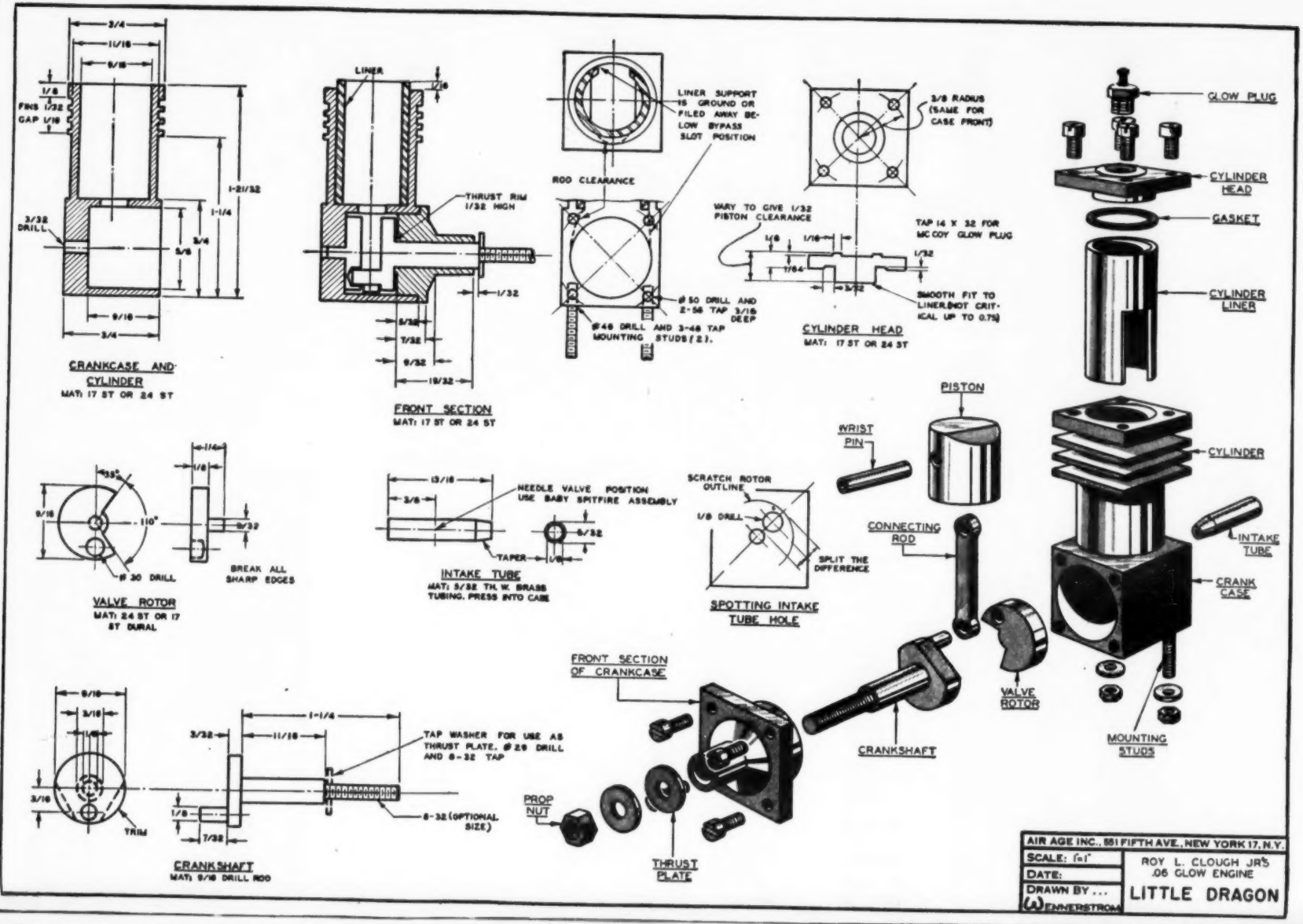
But the pilot who desires year-round utility and complete convertibility of his airplane will find the amphibian the answer to his needs. Currently there are no personal-type amphibians in quantity production. The last successful small amphibian was the Republic *Seabee*, a four-place design developed late in the war. It sold originally for about $4,000 but even in mass production its sales tag crept up to about $6,000 before it went out of production in October, 1947 (after completion of 1,060 of the type!). Since that time there have been no amphibians in production from which the prospective flying sportsman could chose. (*Turn to page* 40)



Late modifications included removal of elevator struts seen here and also the dip in fuselage top



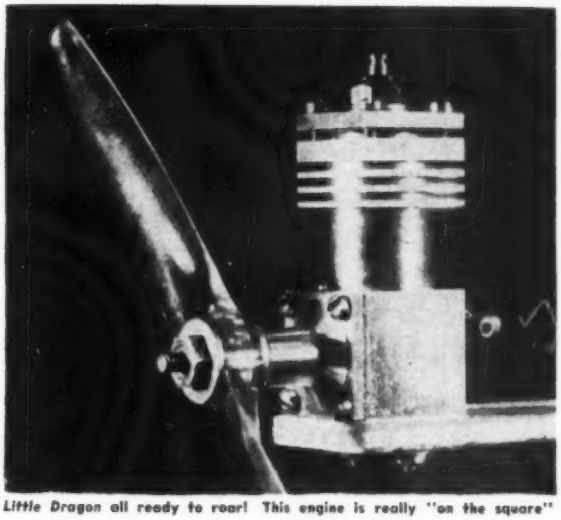
An even later modification than we show has narrow motor nacelle support with a strut on each side


CRANKCASE AND CYLINDER
MAT: 17 ST OR 24 ST
FRONT SECTION
MAT: 17 ST OR 24 ST
LINER
THRUST RIM 1/32 HIGH
LINER SUPPORT IS GROUND OR FILED AWAY BELOW BYPASS SLOT POSITION
ROD CLEARANCE
#50 DRILL AND 2-56 TAP 3/16 DEEP
#48 DRILL AND 3-48 TAP MOUNTING STUDS (2).
3/8 RADIUS (SAME FOR CASE FRONT)
VARY TO GIVE 1/32 PISTON CLEARANCE
TAP 14 X 32 FOR MC COY GLOW PLUG
SMOOTH FIT TO LINER, NOT CRITICAL UP TO 0.75
CYLINDER HEAD
MAT: 17 ST OR 24 ST
GLOW PLUG
CYLINDER HEAD
GASKET
CYLINDER LINER
PISTON
WRIST PIN
CYLINDER
INTAKE TUBE
CRANK CASE
CONNECTING ROD
VALVE ROTOR
MOUNTING STUDS
CRANKSHAFT
FRONT SECTION OF CRANKCASE
PROP NUT
THRUST PLATE
VALVE ROTOR
MAT: 24 ST OR 17 ST DURAL
#30 DRILL
BREAK ALL SHARP EDGES
INTAKE TUBE
MAT: 5/32 TH. W. BRASS TUBING. PRESS INTO CASE
NEEDLE VALVE POSITION USE BABY SPITFIRE ASSEMBLY
TAPER
SCRATCH ROTOR OUTLINE
1/8 DRILL
SPLIT THE DIFFERENCE
SPOTTING INTAKE TUBE HOLE
CRANKSHAFT
MAT: 5/16 DRILL ROD
TAP WASHER FOR USE AS THRUST PLATE, #29 DRILL AND 8-32 TAP
8-32 (OPTIONAL SIZE)
TRIM
AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.
SCALE: full
DATE:
DRAWN BY ... W. ENNERSTROM
ROY L. CLOUGH JR'S .06 GLOW ENGINE
LITTLE DRAGON

LITTLE DRAGON

Part One

by ROY L. CLOUGH, JR.



Little Dragon all ready to roar! This engine is really "on the square"

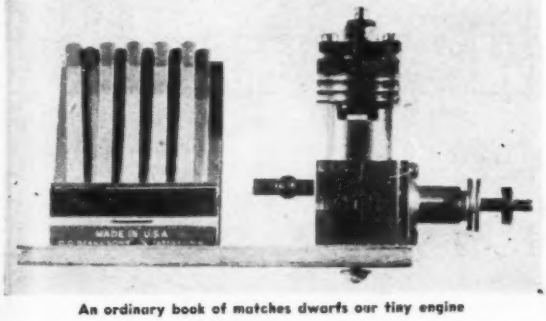
THE *Little Dragon* glow engine is a project any amateur machinist can tackle with full confidence of good results. It does not require any special tools, special talents, or extreme precision. A large part of the total time spent in developing the design was devoted to eliminating awkward machining jobs, delicate operations, and tricky assemblies. If the reader owns a small lathe and can center a piece of stock with 1/64", he need have no qualms about being able to turn out the job. On the other hand, the skilled builder who has a good "touch" for this sort of thing will discover he has an engine which requires absolutely no apologies on the score of being homemade.

The motor is a basic design, as old-engine hands will recognize by the drawings. It has great amounts of leeway at every step of construction. This means there is plenty of room for the correction of errors, which should appeal to the amateur, and equally of importance, it allows the experienced motor builder to "soup-up" the design as he sees fit. For example, the weight of the original came out at 2 oz., complete with plug and prop. Skillful shaving-down by experienced machinists can reduce this figure greatly, but this has nothing to do with the operating characteristics. Port areas and valve timing are laid out with an eye to obtaining maximum startability and a good rate of speed with average construction and internal fits, but the experienced worker who is capable of doing very good work will find it possible to increase the porting and degree of valve opening to obtain an extremely hot engine.

The original *Little Dragon* was turning the plastic prop shown in the photo at 8,000 rpm, 5 mins. after it was assembled. It did this on a break-in mix of 3 parts *O & R No. 2* and 1 part castor oil. This is the performance the average builder can reasonably expect. For experts, and with one of the hot *Francisco Lab* fuels, 10,000 rpm is a reasonably conservative estimate.

The mounting of any engine uses up time and energy and in too many cases is finicky and bothersome. We have tried to get around this and come up with something that is simple, quick, and practical. The two-stud mount is our answer. Simply press the studs against a piece of plywood to mark it for drilling, set the engine in place and run on a couple of nuts. No muss, no fuss, and no bother.

A bore of approximately 7/16" with a 3/8" stroke fixes the displacement at about .06. By selecting these dimensions, it was possible to take advantage of material sizes which simplified construction considerably and is one of the reasons you will find dimensions indicated in 32nds of an inch instead of thousandths.



An ordinary book of matches dwarfs our tiny engine

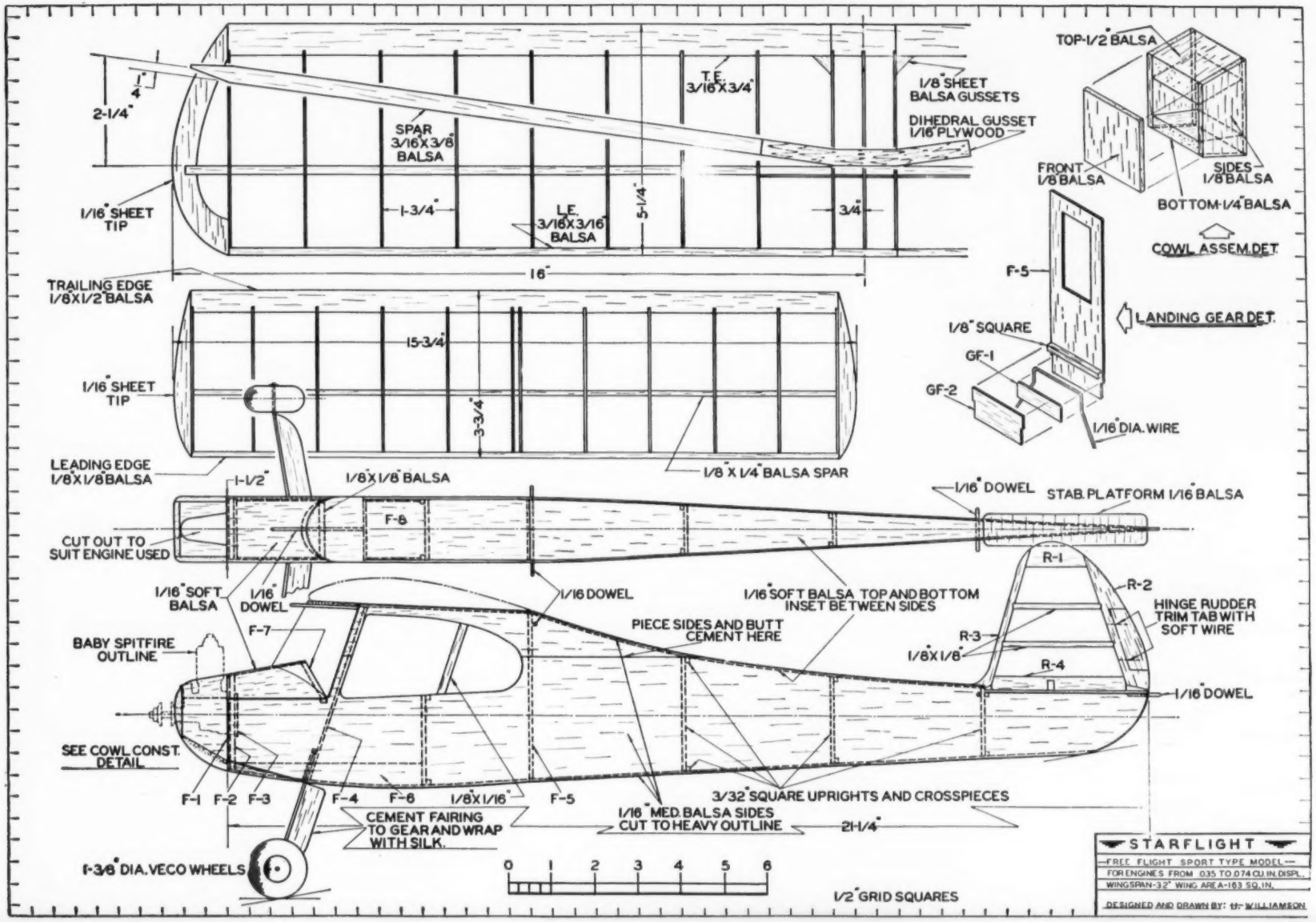
However, those who wish to build the engine to conform to AMA ½A regulation can use a 1/2" O.D. cylinder liner instead of the 9/16" specified on the plans. This will bring the displacement down to about .049, safely within the rules for engines of .05 or less. This will require slight alterations in the width of the con rod for adequate clearance, and of course the liner hole, piston size and head are changed accordingly. Conversely, a skillful builder can increase the displacement to more than .070 if he desires.

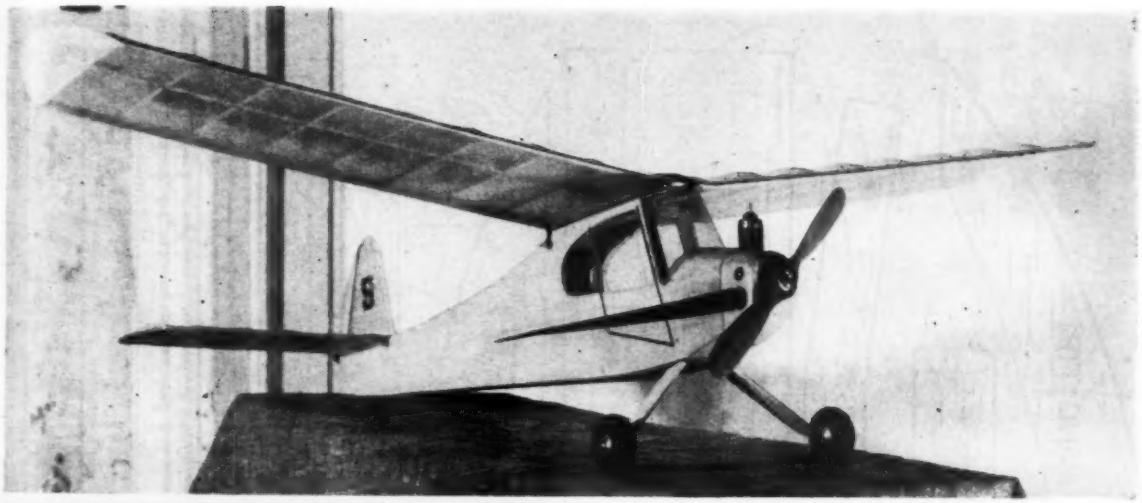
To those who think an elaborate machine outlay is required in order to build engines, a glance through the list of tools used to make the original should prove refreshing. These were: small lathe, hack saw, hand drill, two files, two taps, one die, and a pocket scale graduated in 64ths. A micrometer was used to check sizes, but actually could have been dispensed with. And the big news, of course, is that no milling operations are required.

The *Little Dragon* employs what is known as the "sleeve-in-block" style of construction. Instead of having separate cylinder and crankcase, one blends into the other, eliminating cylinder tie downs, heat dams, and two more places for errors to accumulate. The engine block serves the same purpose as the "keel" frequently used in model airplane construction, being a basic member, which when laid out correctly serves as an accurate basis for the remainder of the construction. The block is the easiest part to make, in terms of tolerances, and serves the amateur builder the purpose of getting his hand in as he goes along. Once the block is made the rest of the engine falls right into line.

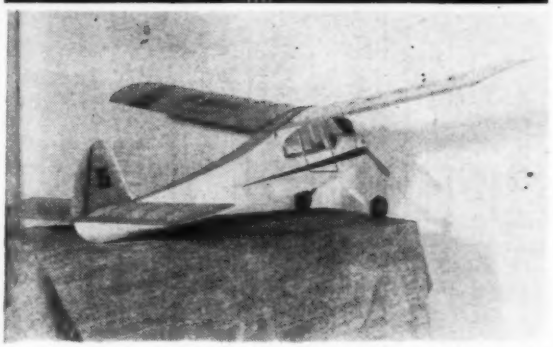
Cut off about 1-7/8" of 3/4" sq. *hard* aluminum alloy bar stock, center it accurately in the four-jaw and face off the end. This gives a plane surface to set against the chuck face. Remove the piece, recenter, and face it down to the proper size. Next, outline the cylinder block. Here is a good rule to remember: always keep as much stock between the end of the piece and the chuck as possible; in other words, make the first cuts out near the end to leave a maximum diameter of supporting metal. By this rule, we see that the fins are machined first. If your lathe is a light one, use the back gears and feed the finning tool in slowly, particularly at the start of each cut where it is chopping at the square corners of the stock.

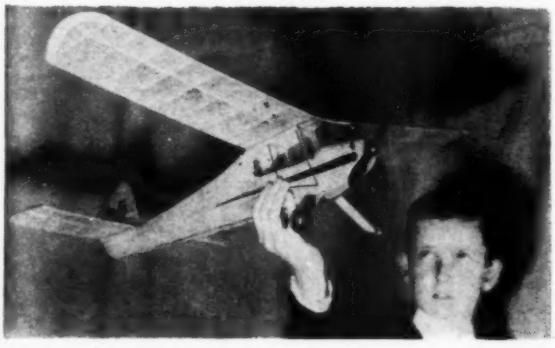
The first fin is extra heavy because this must carry the screws which will hold the head in place. If you have cut the piece a bit short by accident, you may take the error out of the first fin. For example, if the piece is 1/32" shorter than it should be, the first fin would be 3/32" deep instead of 1/8". This is all right, but don't make it any thinner. There are three fins below this, each 1/32" deep with a 1/16" gap between all fins. Since the lowest fin *must* come in exactly the right position because of the exhaust port, cut this one after you have made the top fin. If your finning tool isn't quite the correct width, split the difference to fix the location of the middle two fins. Do not cut the fins too deeply and weaken the block. A fin depth of 1/32" measured from the flat of the stock is entirely adequate. Turn down the "barrel" and buff it with a crocus cloth. A good shine here increases (*Turn to page* 48)


2-1/4"
1/4"
SPAR 3/16"X3/8" BALSA
T.E. 3/16"X3/4"
1/8" SHEET BALSA GUSSETS
DIHEDRAL GUSSET 1/16" PLYWOOD
1/16" SHEET TIP
1-3/4"
L.E. 3/16"X3/16" BALSA
5-1/4"
3/4"
16"
TRAILING EDGE 1/8"X1/2" BALSA
15-3/4"
1/16" SHEET TIP
3-3/4"
LEADING EDGE 1/8"X1/8" BALSA
1/8"X1/4" BALSA SPAR
1-1/2"
1/8"X1/8" BALSA
F-8
CUT OUT TO SUIT ENGINE USED
1/16" DOWEL
STAB. PLATFORM 1/16" BALSA
1/16" SOFT BALSA
1/16" DOWEL
F-7
1/16 DOWEL
1/16" SOFT BALSA TOP AND BOTTOM INSET BETWEEN SIDES
PIECE SIDES AND BUTT CEMENT HERE
BABY SPITFIRE OUTLINE
R-1
R-2
HINGE RUDDER TRIM TAB WITH SOFT WIRE
R-3
1/8"X1/8"
R-4
1/16" DOWEL
SEE COWL CONST. DETAIL
F-1 F-2 F-3 F-4 F-6 1/8"X1/16" F-5
3/32" SQUARE UPRIGHTS AND CROSSPIECES
CEMENT FAIRING TO GEAR AND WRAP WITH SILK.
1/16" MED. BALSA SIDES CUT TO HEAVY OUTLINE
21-1/4"
1-3/8" DIA. VECO WHEELS
0 1 2 3 4 5 6
1/2" GRID SQUARES
TOP-1/2" BALSA
FRONT 1/8" BALSA
SIDES 1/8" BALSA
BOTTOM-1/4" BALSA
COWL ASSEM. DET.
F-5
LANDING GEAR DET.
1/8" SQUARE
GF-1
GF-2
1/16" DIA. WIRE
STARFLIGHT
—FREE FLIGHT SPORT TYPE MODEL—
FOR ENGINES FROM .035 TO .074 CU. IN. DISPL.
WINGSPAN-32" WING AREA-163 SQ. IN.
DESIGNED AND DRAWN BY: H. WILLIAMSON



STAR FLIGHT





by HARRY A. WILLIAMSON

IF you get the impression, when looking at the illustrations on this page, that you've seen the *Starflight* before, you are probably right. You can see the *Starflight* any time you visit your neighborhood airport and practically every time you glance nonchalantly aloft on a sunny afternoon, to check that putt-putt overhead.

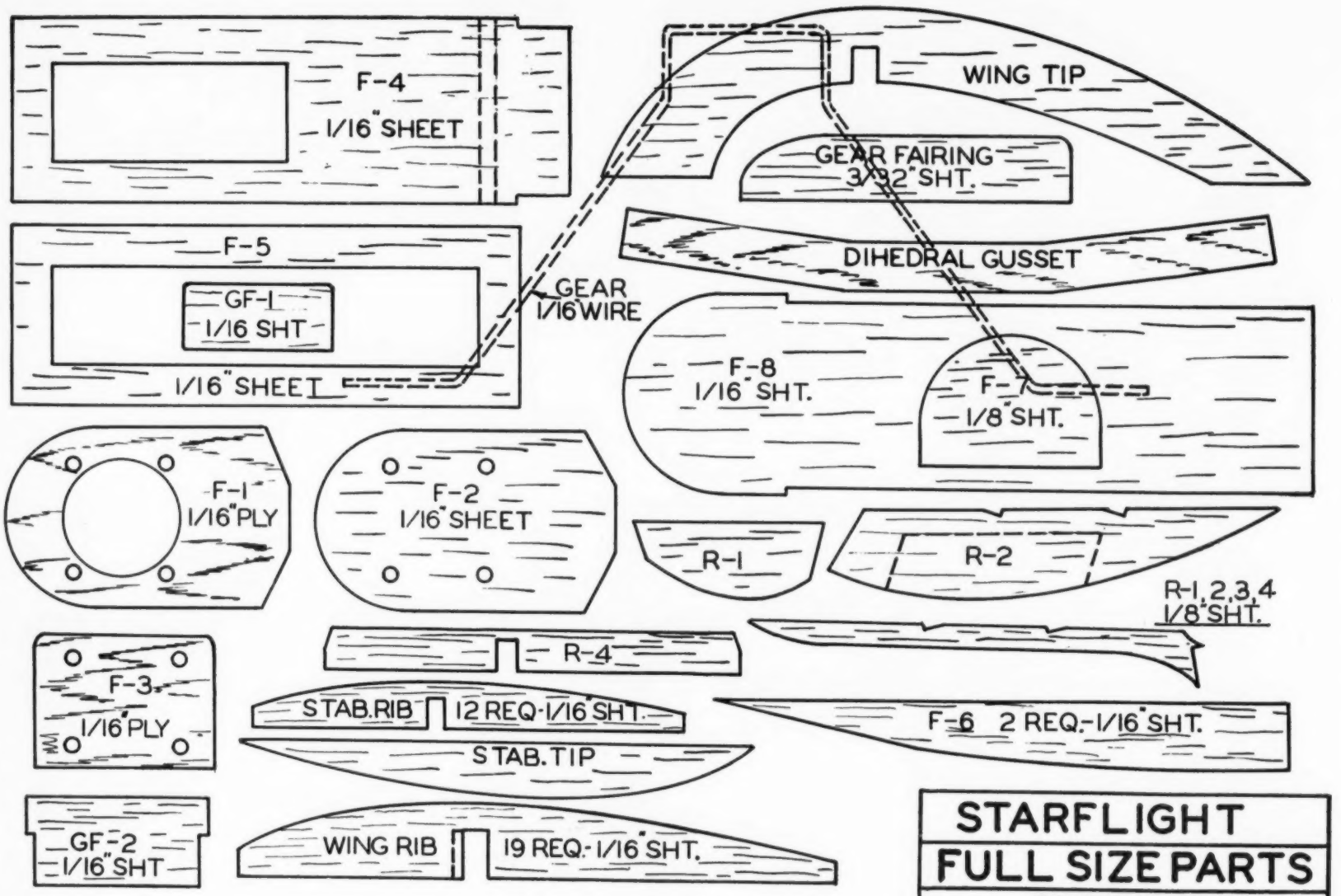
Starflight has been the cause of several minor disagreements. Some people say it resembles a Piper *Cub*, others, an Aeronca *Champion*. Truthfully, it was designed with both airplanes in mind, and an attempt was made to incorporate some of the lines of both ships, in conjunction with the elements of design necessary in a good free flight model.

After many sketches, the model as presented here was evolved, and it has proved to be as successful as we had hoped. We recommend the *Starflight* for beginners in gas modeling and for those modelers who are making the transition from controline to free flight. We feel that a little skill and an understanding of the drawings will result in a model as smooth flying as the original. If you are in the market for realism in flight and appearance, and simplicity of construction, we think *Starflight* is for you, so clean the debris from your work bench and let's go to work.

Fuselage. Enlarge the drawings to three times the size shown by use of the scale ruler and grid lines. Make two sides as shown by the heavy outline. From the full size pattern sheet, make one each of all the formers shown. Add 3/32" square stiffeners to both sides as shown in addition to formers F-6. Cement formers F-4 and 5 to one side only, square them up and allow to dry. After drying, cement the other side to these formers and put the assembly aside. Bend the landing gear from 1/16" diameter wire and cut the formers GF-1 and GF-2 from 1/16" hard balsa. Now, add the gear and these two balsa pieces to F-5 and cement liberally. Join the sides at the rear and make certain the curvature of each side is the same. The holes shown on F-1, F-2, F-3 are for the Anderson *Baby Spitfire*. Drill holes to suit whatever engine you wish to use, making certain the thrust line remains as shown on the plans. Cement these formers in place and add the 3/32" square crosspieces, along with F-7 and F-8. Cover the nose with 1/16" soft sheet and add the top and bottom of the fuselage. Be sure to insert it *between* the sides as shown on the plans; we have found that the extra 5 mins. of work needed for this is worth the effort when the "crush-test boys" give your ship the business. Sand the assembly well, add the stabilizer platform and dowels and cover with the same material as used on the wing, preferably lightweight *Silkspan* or tissue, dyed in your favorite color. Finish with two coats of thinned dope and another light sanding. Add .010" thick celluloid windows and windshield—and the fuselage is complete.

Cowl. Make the cowl as shown in the details on the drawing, spot cement to the fuselage after bolting the engine in place, and sand and carve to size. This assures a smooth-flowing blend of lines from fuselage to cowl. Again, cover with strips, using the same material as used on the fuselage. The cowl may be held in place with dress snaps or rubber bands.

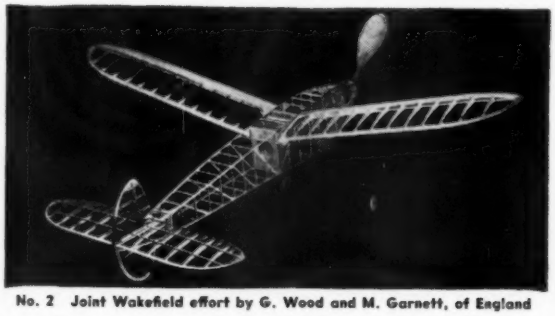
Wing and Tail Group. It is not necessary to enlarge the drawings to make these units. Cut the required number of pieces using the full size patterns and (*Turn to page* 49)


F-4
1/16" SHEET
WING TIP
GEAR FAIRING
3/32" SHT.
DIHEDRAL GUSSET
F-5
GF-1
1/16 SHT
1/16" SHEET
GEAR
1/16 WIRE
F-8
1/16" SHT.
F-7
1/8" SHT.
F-1
1/16" PLY
F-2
1/16" SHEET
R-1
R-2
R-1, 2, 3, 4
1/8" SHT.
R-4
F-3
1/16" PLY
STAB. RIB
12 REQ-1/16" SHT.
F-6 2 REQ.-1/16" SHT.
STAB. TIP
GF-2
1/16" SHT
WING RIB
19 REQ.-1/16" SHT.
STARFLIGHT
FULL SIZE PARTS
SHEET 2

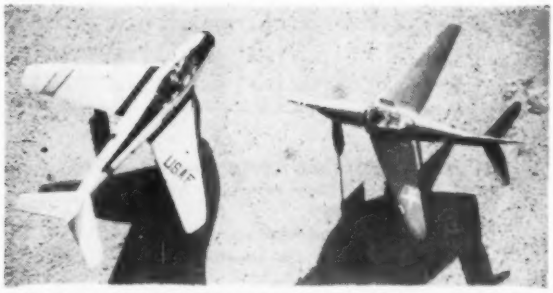
AIR WAYS

NEWS OF MODEL PLANE EXPERIMENTERS FROM ALL OVER THE WORLD

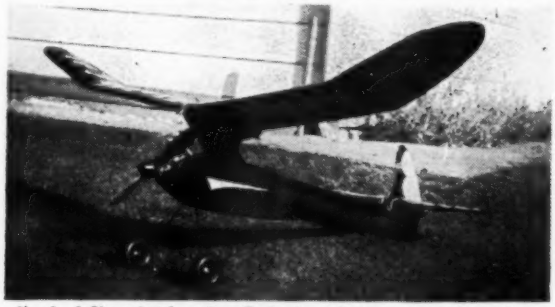
No. 1 Sgt. F. Lamster built this 7' glider in Indonesia



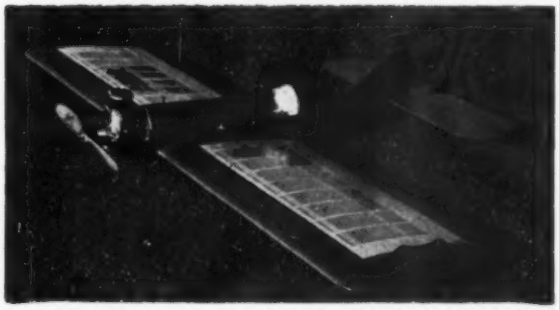
No. 2 Joint Wakefield effort by G. Wood and M. Garnett, of England



No. 3 A pair of solid scale models, the work of Pfc. Dwight Brooks



No. 4 A *Skyrocket* from New Zealand, made from a kit by Byron Burr



No. 5 An original ship with *Glo-Devil* engine—design by C. I. Mitchell, Jr.

No. 6 Harry Haskell built the beautiful B-17 he holds here

THE MUDDLE over FCC regulations covering operation in the so-called Citizens Band has now been cleared and the amended regulations established by the Commission. Modelers who hope to operate on this Band, however, should note that only one manufacturer has received FCC approval on his Citizens Band R.C. transmitter and it may be some time yet, before his equipment is available to all, through normal channels.

Meanwhile, the single 27 mc. experimental transmitter authorized by the FCC to be used by the AMA has been tested in several locations, and results have been very gratifying. This equipment operates on the "low-frequency Citizens Band," which is not legally open yet for commercial development, as is the 465 mc. band.

As we have said many times before, our advice to potential radio control fliers is still—study up and get your Amateur license!

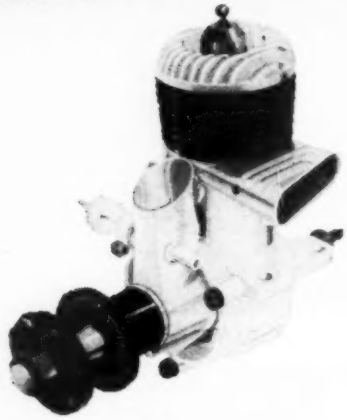
THE 1949 WAKEFIELD Meet was run off complete with a full American team in attendance. Our boys last year had a tough time in some cases, in arranging the necessary finances. This year it just couldn't be done. Despite the fact that the various regional elimination meets ran off much better this year, it was impossible to arrange transportation to Finland for them. Some of their ships will be proxy-flown, but this is a poor substitute to having them flown by the individual builders, who designed and understand them.

Let's start right now to gather the capital required to send a full American team *in person*, to any country necessary, for participation in the 1951 Wakefield. (*Turn to page* 46)

NEW! 1951 O&R ..

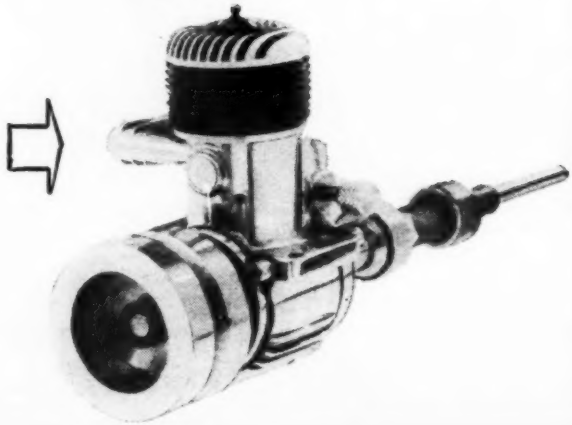
O&R Lapped Piston Engines are EASIER STARTING, HIGHER POWERED and MORE DEPENDABLE than ever before. They are built to give TOP PERFORMANCE and LONG LIFE. Get your O&R Engine at your dealer's right away.

MODEL	TYPE	CLASS	DISP.	BORE	STROKE	STATIC THRUST	WEIGHT OZS.	PRICE
19 19	GLOW Ignition	"A" 'A'	.1962 1962	.684 684	.534 534	40 ozs. 40 ozs.	4.75 4.75	$10.95 11.95
23 23	GLOW Ignition	"B" 'B'	.2299 2299	.684 684	.625 625	50 ozs. 50 ozs.	5.00 5.00	10.95 11.95
29 29	GLOW Ignition	"B" 'B'	.2999 2999	.759 759	.663 663	64 ozs. 64 ozs.	5.25 5.25	12.95 13.95
33 33	GLOW Ignition	"C" 'C'	.3299 3299	.759 759	.729 729	68 ozs. 68 ozs.	5.37 5.37	12.95 13.95
60 60	GLOW Ignition	"C" 'C'	.6000 6000	.937 937	.875 875	90 ozs. 90 ozs.	10.00 10.00	13.95 14.95



The NEW O&R FRONT END FLYWHEEL Marine Engine changes the whole concept of model boating. It's truly a REAL Marine Engine from stem to stern.

- ✓ **Front End Flywheel permits lower placement in hull.**
- ✓ **Dual Counter-weighted for smoother running.**
- ✓ **Less Propeller Shaft Angle.**
- ✓ **Roller Bearing Crankshaft for longer life.**
- ✓ **All New High Compression Piston for greater power.**
- ✓ **Ball Bearing Thrust reduces friction.**



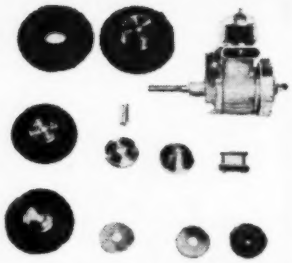
O&R .29 Marine Engine complete with thrust bearing and universal coupling $14.95
Thrust Bearing only 1.00
Universal Coupling (available in 15 thread sizes) only 1.49

THE WORLD'S MOST AUTHENTIC MODEL MIDGET RACER!

$19.95 Complete

WITH O&R SPORT DRIVE UNIT

A true 12 to 1 scale model of the famous "Offie" that consistently held the No. 1 position at Gilmore Racing Oval in Los Angeles. It's not only fun to race, but is an accurate, fully detailed reproduction of a real midget racer. Can be used for either tether or power operation. It's safe and simple to operate in small areas. Available in an assortment of brilliant baked enamel colors.



O&R SPORT DRIVE UNIT

Sport Drive Unit has built-in 3 to 1 planetary drive, automatically lubricated, with centrifugal clutch that allows standing starts for realistic action.

Model Racer only	$ 5.95
Sport Drive Unit only	13.95
Model Racer Complete with Sport Drive Unit	19.95
Authentic Driver illustrated, extra . .	1.50
Swivel Post complete with Wire . .	1.00

O&R COMPETITION POWER DRIVE UNIT

Designed for competition racing. Four semi-pneumatic tires and hubs. The O&R Competition Unit is available for installation in standard O&R Model Racers.

Complete Competition Power Drive Unit $15.95

IF NO LOCAL DEALER IS CONVENIENT MAIL ORDERS DIRECT TO . . .

ENGINES & ACCESSORIES

SNAP-OR-PACK

Fits all O&R and many other makes of Glow Plugs. Double connection Instant Clip included.
$.35

O&R FUELS

No. 2 GLOW PLUG
½ Pt. 40c Pt. 75c
Qt. $1.40
O&R AA
½ Pt. 40c Pt. 75c
O&R "30 PLUS"
Pt. $1.00 Qt. $1.75

Most popular and largest selling model engine fuels in the world.

INSTANT CLIP

Designed for greater efficiency. Gives positive double connection and much easier starting.
INSTANT CLIP ONLY **15c**

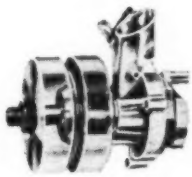
GLOW PLUGS

STOCK NO.	TYPE	THREAD	HEX	THREAD LENGTH	WEIGHT OZS	WEIGHT GRAMS	PRICE
5-2	Standard	¼" x 32	⅜"	3/16"	135	3.82	65c
5-4	Standard	⅛ x 24	⅜"	13/64"	250	7.08	65c
5-R	Racing	¼" x 32	5/16"	7/32"	07	1.98	65c
5-R	Racing	⅛ x 24	7/16"	7/32"	16	4.53	65c
AA	Baby	¼" x 32	5/16"	5/32"	10	2.83	65c
Infant		None	None	None	08	2.6	65c

NEW! HI-GLOW PLUGS

STOCK NO.	TYPE	THREAD	HEX	THREAD LENGTH	WEIGHT OZS	WEIGHT GRAMS	PRICE
Spitfire OR Cub	Hi-Glow	¼" x 32	5/16"	5/32"	10	2.83	65c
Atwood	Hi-Glow	¼" x 32	5/16"	5/32"	05	1.42	65c
5-RR	Hi-Glow Racing	¼" x 32	5/16"	7/32"	07	1.98	65c

FLYWHEEL



Exclusive Trueing Washer insures "wobble-free" running.
19, 23, 29, 33 FLYWHEEL . **$1.25**
60 FLYWHEEL **1.50**

UNIVERSAL COUPLING

MARINE FLYWHEEL

THRUST BEARING

The only complete line of improved universal couplings. Available in the thread sizes shown.
UNIVERSAL COUPLING . . . **$1.49**
Wrench **25c**
BALL THRUST BEARING, COMPLETE **$1.00**
Marine Flywheel **$1.50**

COUPLING THREAD SIZES			COUPLING THREAD SIZES		
# 5–40	TO	# 5–40	# 6–32	TO	⅛–24
# 5–40	TO	# 6–32	# 10–32	TO	# 10–32
# 5–40	TO	# 10–32	# 10–32	TO	¼–28
# 5–40	TO	¼–28	# 10–32	TO	⅜–24
# 5–40	TO	⅜–24	¼–28	TO	¼–28
# 6–32	TO	# 6–32	¼–28	TO	⅜–24
# 6–32	TO	# 10–32	⅜–24	TO	⅜–24
# 6–32	TO	¼–28			

DEALERS
Write for particulars on how you can obtain the NEW 1951 O&R Catalogs.

O&R *Standard of the Model World*

SEND FOR THIS BEAUTIFULLY ILLUSTRATED 4-COLOR CATALOG

. . . that will give you many new and useful ideas for your model building. Fill in the coupon below and mail together with 15c in stamps or coins to cover mailing and handling costs. SEND FOR YOUR COPY NOW!

O&R .23 again wins the 1950 Nationals. Joseph W. Foster, the winner in Class B.

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OHLSSON & RICE, INC.
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Emery at Grande Vista
Los Angeles 23, California

Gentlemen:

Please RUSH_____copies of the NEW 1951 O&R Catalog at 15c each for which I am enclosing_____in stamps or coins to cover handling and mailing.

Name_____

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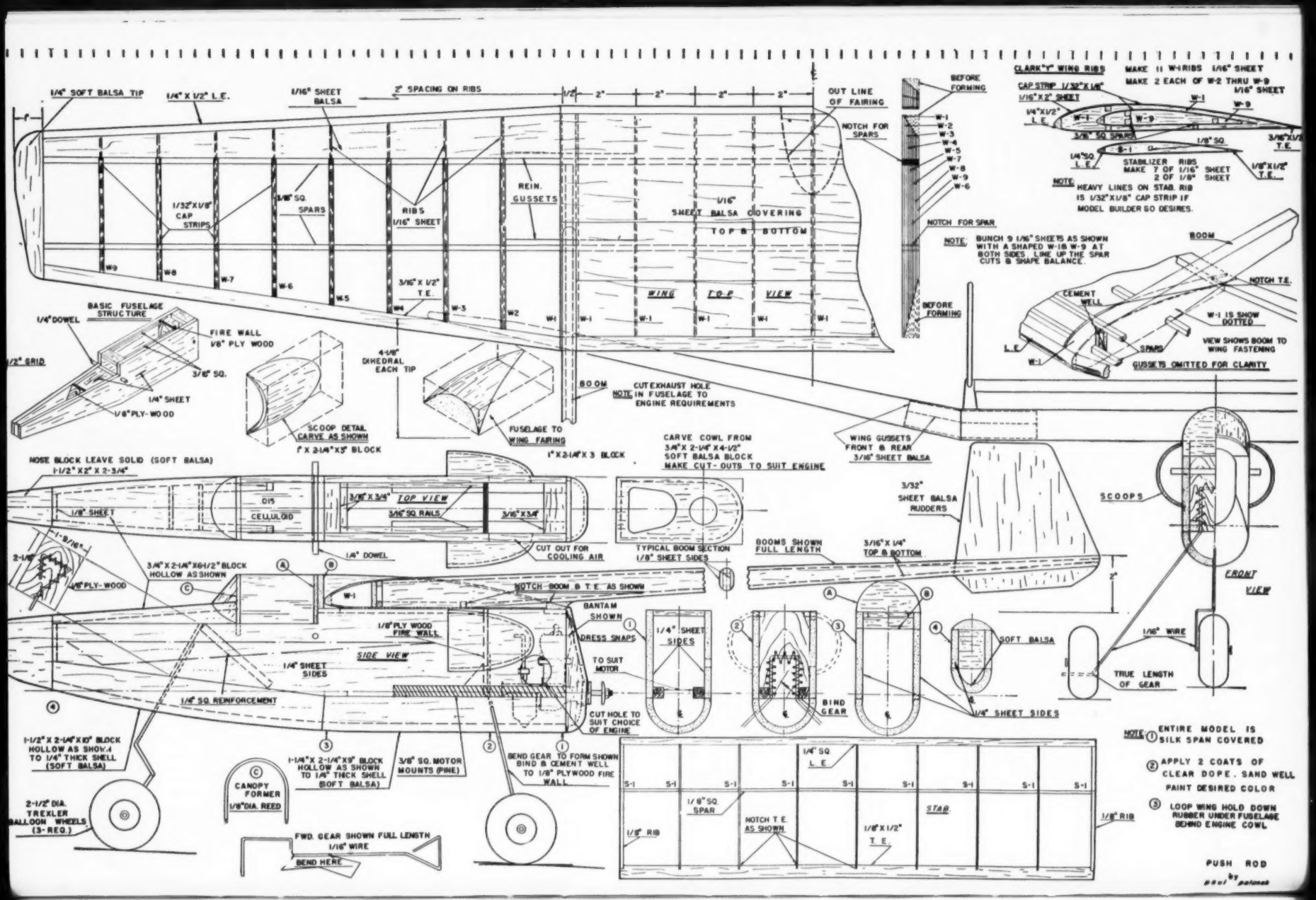
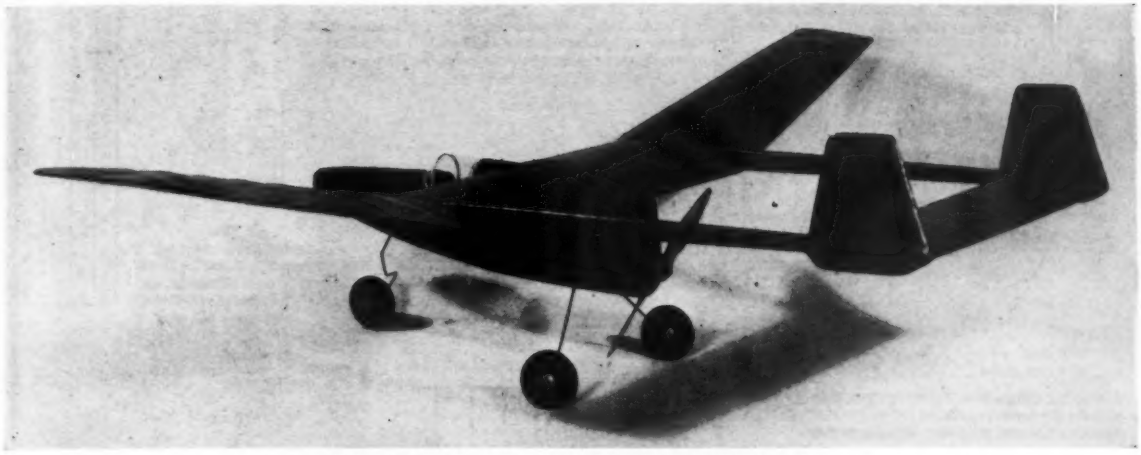
City_____Zone_____State_____

Ohlsson & Rice, Inc.

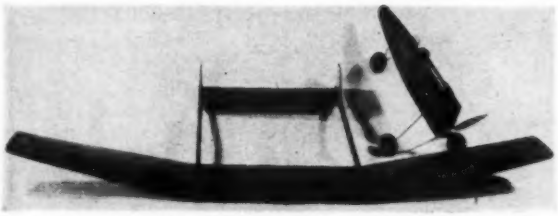
Emery at Grand Vista, Los Angeles 23, California


1/4" SOFT BALSA TIP
1/4" X 1/2" L.E.
1/16" SHEET BALSA
2" SPACING ON RIBS
OUT LINE OF FAIRING
NOTCH FOR SPARS
1/32"X1/8" CAP STRIPS
3/16" SQ. SPARS
RIBS 1/16" SHEET
REIN. GUSSETS
1/16" SHEET BALSA COVERING TOP & BOTTOM
3/16" X 1/2" T.E.
WING TOP VIEW
BEFORE FORMING
W-1
W-2
W-3
W-4
W-5
W-7
W-8
W-9
W-6
NOTCH FOR SPAR
CLARK "Y" WING RIBS
MAKE 11 W-1 RIBS 1/16" SHEET
MAKE 2 EACH OF W-2 THRU W-9 1/16" SHEET
CAP STRIP 1/32"X1/8" 1/16"X2" SHEET
1/4"X1/2" L.E.
3/16" SQ SPARS
1/8" SQ
1/4"SQ L.E.
3/16"X1/2" T.E.
1/8"X1/2" T.E.
STABILIZER RIBS MAKE 7 OF 1/16" SHEET 2 OF 1/8" SHEET
NOTE: HEAVY LINES ON STAB. RIB IS 1/32"X1/8" CAP STRIP IF MODEL BUILDER SO DESIRES.
NOTE: BUNCH 9 1/16" SHEETS AS SHOWN WITH A SHAPED W-1& W-9 AT BOTH SIDES. LINE UP THE SPAR CUTS & SHAPE BALANCE.
BOOM
NOTCH T.E.
CEMENT WELL
L.E.
SPARS
W-1
W-1 IS SHOW DOTTED
VIEW SHOWS BOOM TO WING FASTENING
GUSSETS OMITTED FOR CLARITY
1/4"DOWEL
BASIC FUSELAGE STRUCTURE
FIRE WALL 1/8" PLY WOOD
1/2" GRID
3/16" SQ.
1/4" SHEET
1/8"PLY-WOOD
SCOOP DETAIL CARVE AS SHOWN
4-1/8" DIHEDRAL EACH TIP
FUSELAGE TO WING FAIRING
BOOM
NOTE CUT EXHAUST HOLE IN FUSELAGE TO ENGINE REQUIREMENTS
WING GUSSETS FRONT & REAR 3/16" SHEET BALSA
CARVE COWL FROM 3-1/4" X 2-1/4" X 4-1/2" SOFT BALSA BLOCK MAKE CUT-OUTS TO SUIT ENGINE
NOSE BLOCK LEAVE SOLID (SOFT BALSA) 1-1/2" X 2" X 2-3/4"
1" X 2-1/4" X 5" BLOCK
1" X 2-1/4" X 3 BLOCK
3/32" SHEET BALSA RUDDERS
SCOOPS
FRONT VIEW
1/8" SHEET
.015 CELLULOID
3/16" X 3/4" TOP VIEW
3/16" SQ RAILS
3/16" X 3/4"
CUT OUT FOR COOLING AIR
1/4" DOWEL
TYPICAL BOOM SECTION 1/8" SHEET SIDES
BOOMS SHOWN FULL LENGTH
3/16" X 1/4" TOP & BOTTOM
2"
1-9/16"
2-1/4"
1/8"PLY-WOOD
3/4" X 2-1/4" X 6-1/2" BLOCK HOLLOW AS SHOWN
NOTCH BOOM & T.E. AS SHOWN
BANTAM SHOWN
DRESS SNAPS
TO SUIT MOTOR
1/8" PLY WOOD FIRE WALL
SIDE VIEW
1/4" SHEET SIDES
1/4" SQ REINFORCEMENT
CUT HOLE TO SUIT CHOICE OF ENGINE
1/4" SHEET SIDES
SOFT BALSA
BIND GEAR
1/4" SHEET SIDES
1/16" WIRE
TRUE LENGTH OF GEAR
1-1/2" X 2-1/4" X 10" BLOCK HOLLOW AS SHOWN TO 1/4" THICK SHELL (SOFT BALSA)
1-1/4" X 2-1/4" X 5" BLOCK HOLLOW AS SHOWN TO 1/4" THICK SHELL (SOFT BALSA)
3/8" SQ. MOTOR MOUNTS (PINE)
BEND GEAR TO FORM SHOWN BIND & CEMENT WELL TO 1/8" PLYWOOD FIRE WALL
CANOPY FORMER 1/8" DIA. REED
2-1/2" DIA. TREXLER BALLOON WHEELS (3-REQ.)
FWD. GEAR SHOWN FULL LENGTH 1/16" WIRE
BEND HERE
1/4" SQ. L.E.
S-1
1/8" SQ. SPAR
NOTCH T.E. AS SHOWN
1/8" RIB
1/8" X 1/2" T.E.
STAB.
1/8" RIB
NOTE ① ENTIRE MODEL IS SILK SPAN COVERED
② APPLY 2 COATS OF CLEAR DOPE. SAND WELL PAINT DESIRED COLOR
③ LOOP WING HOLD DOWN RUBBER UNDER FUSELAGE BEHIND ENGINE COWL
PUSH ROD
paul by potomac



Motor and propeller are well out of harm's way in this design!

PUSH ROD



Fuselage is turned backward relative to wings in above view

by PAUL PALANEK

Push Rod was primarily designed as a sport and all-around flying model, with no intent on contest fame, unless the Clark Y airfoil the model now carries is replaced with an airfoil of more suitable contest qualities. The basic design has been used by the author for a number of years, but construction of *Push Rod* was abruptly curtailed at the request of the government. Upon returning to civilian life, what had been built of the model was found in a heap of balsa and dust. Starting from scratch was more than necessary.

Push Rod sports ample wing area (400 sq. in. of it), with a span of 55". She may be powered with engines of .19 to .29 cu. in. displacement; the model shown in the photos sports an *O.K. Bantam*. The pusher design is easy on props, while the wide spacing of booms allows ample elbow room for starting the engine. The tricycle gear saves wear and tear on the booms as well as on props and adds a measure of class to the model. The ship has an unusually flat glide and is really an eye-catcher on the flying field. But enough about *Push Rod* history—let's buckle down to building her.

Each modeler has his own system of starting construction, but the author strongly suggests following the procedure outlined here. Study the plans carefully, paying particular attention to the landing gear installation and the method employed in fastening booms to wing center section. The entire ship is built of medium-hard quality balsa.

Completely familiarize yourself with the drawing, and after having enlarged the necessary portions to full size, start construction of the booms. The sides are 1/8" sheet balsa, with 1/4" sq. spacers tapered to 3/32" at the tail end. Cement well to form a box-type section. The booms should be left longer than needed, and trimmed prior to assembly. The 1/4" boom spacers start 4" from the tail end to allow a 3/32" opening for the rudders.

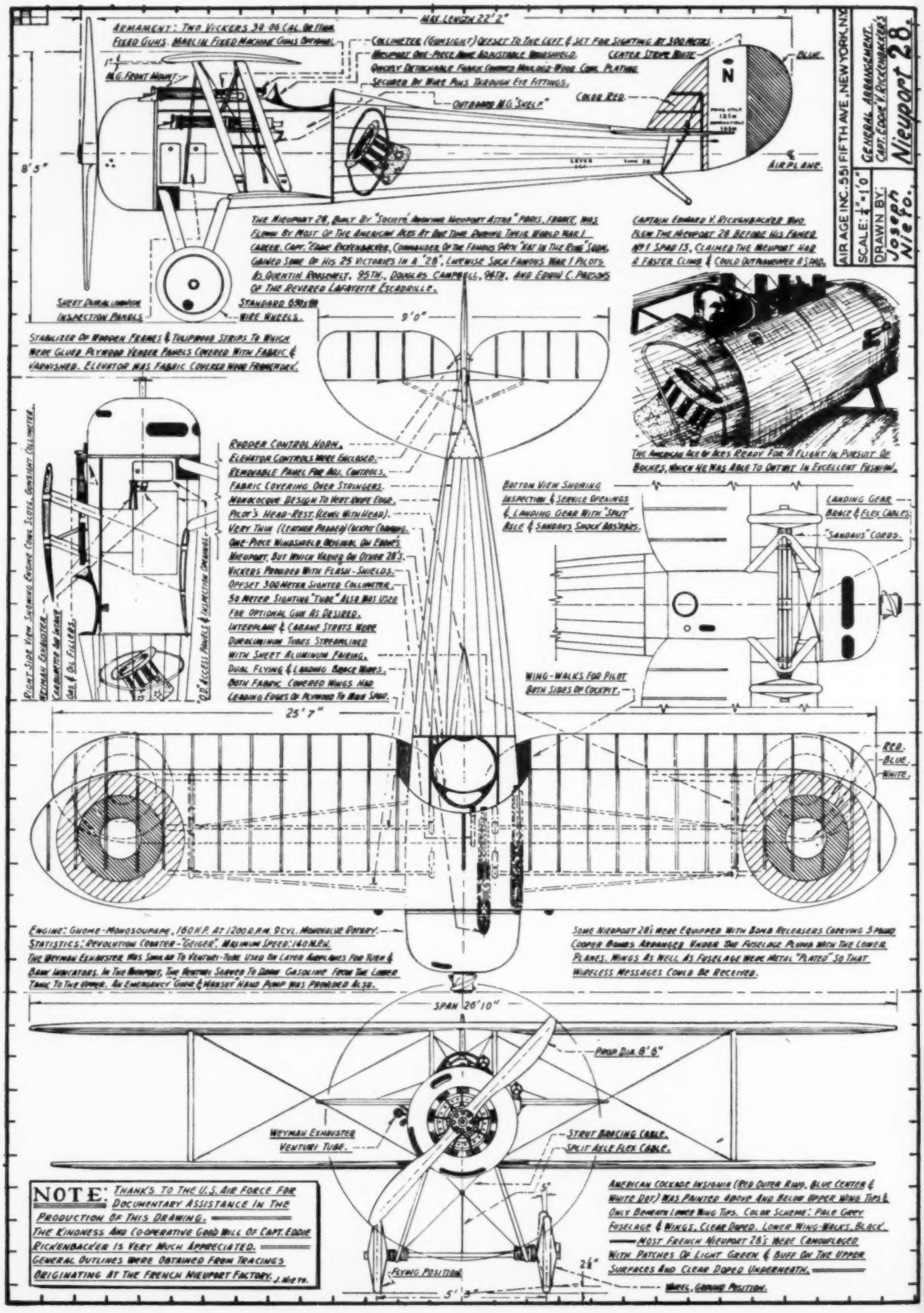
The rudders are made in two sections, butt cemented, of 3/32" x 2" sheet balsa cut to a height shown on the drawing; when completely dried, trim to the shape shown and cement in place, taking care to assure vertical alignment. While the boom and rudder assembly is left to dry, let us turn to the wing.

The wing spar is made next. Assemble the spars with 3/16" sq. stock on a flat surface, cutting one strip for the upper spar and one for the lower; butt cement the outer panel spars to the center section, building in the proper dihedral angle. Cut four reinforcement plates from 1/8" sheet and cement over the butt joints in the spar. Leave the outer panel spars dangling.

While this assembly is drying, cut the eleven center section ribs of 1/16" sheet; the taper panels have eight each, also cut

(*Turn to page* 51)

Push Rod is designed as a sport model with which you can have a lot of fun


ARMAMENT: TWO VICKERS 30-06 CAL. OR 7.7MM FIXED GUNS. MARLIN FIXED MACHINE GUNS OPTIONAL.
MAX. LENGTH 22'2"
COLLIMETER (GUNSIGHT) OFFSET TO THE LEFT & SET FOR SIGHTING AT 300 METERS.
WINDSHIELD.
CENTER STRIPE WHITE
BLUE
M.G. FRONT MOUNT
OUTBOARD M.G. "SKELP"
COLOR RED
AIRPLANE
8'5"
THE NIEUPORT 28, BUILT BY "SOCIETE ANONYME NIEUPORT ASTRA" PARIS, FRANCE, WAS FLOWN BY MOST OF THE AMERICAN ACES AT ONE TIME DURING THEIR WORLD WAR I CAREER. CAPT. EDDIE RICKENBACKER, COMMANDER OF THE FAMOUS 94TH "HAT IN THE RING" SQDN. GAINED SOME OF HIS 25 VICTORIES IN A '28', LIKEWISE SUCH FAMOUS WAR I PILOTS AS QUENTIN ROOSEVELT, 95TH., DOUGLAS CAMPBELL, 94TH., AND EDWIN C. PARSONS OF THE REVERED LAFAYETTE ESCADRILLE.
CAPTAIN EDWARD V. RICKENBACKER WHO FLEW THE NIEUPORT 28 BEFORE HIS FAMED #1 SPAD 13, CLAIMED THE NIEUPORT HAD A FASTER CLIMB & COULD OUTMANEUVER A SPAD.
SHEET DURAL. LOWER INSPECTION PANELS
STANDARD 670x100 WIRE WHEELS.
9'0"
STABILIZER OF WOODEN FRAMES & PLYWOOD STRIPS TO WHICH WERE GLUED PLYWOOD VENEER PANELS COVERED WITH FABRIC & VARNISHED. ELEVATOR WAS FABRIC COVERED WOOD FRAMEWORK.
THE AMERICAN ACE OF ACES READY FOR A FLIGHT IN PURSUIT OF BOCHES, WHICH HE WAS ABLE TO OUTWIT IN EXCELLENT FASHION.
RUDDER CONTROL HORN.
ELEVATOR CONTROLS WERE ENCLOSED.
REMOVABLE PANEL FOR ADJ. CONTROLS.
FABRIC COVERING OVER STRINGERS.
MONOCOQUE DESIGN TO VERY KNIFE EDGE.
PILOT'S HEAD-REST. (LEVEL WITH HEAD).
VERY THIN (LEATHER PADDED) COCKPIT COAMING.
ONE-PIECE WINDSHIELD ORIGINAL ON EARLY NIEUPORT, BUT WHICH VARIED ON OTHER 28'S.
VICKERS PROVIDED WITH FLASH-SHIELDS.
OFFSET 300 METER SIGHTED COLLIMETER.
50 METER SIGHTING "TUBE" ALSO WAS USED FOR OPTIONAL GUN AS DESIRED.
INTERPLANE & CABANE STRUTS WERE DURALUMINIUM TUBES STREAMLINED WITH SHEET ALUMINIUM FAIRING.
DUAL FLYING & LANDING BRACE WIRES.
BOTH FABRIC COVERED WINGS HAD LEADING EDGES OF PLYWOOD TO WARD SPAR.
PILOT SIDE VIEW SHOWING ENGINE COWL SLOTS, GUNSIGHT COLLIMETER, WEYMAN EXHAUSTER, CARBURETOR AIR INTAKE, OIL & OIL FILLERS.
"D" ACCESS PANELS & INSPECTION OPENINGS
BOTTOM VIEW SHOWING INSPECTION & SERVICE OPENINGS & LANDING GEAR WITH "SPLIT" AXLE & SANDAUS SHOCK ABSORBERS.
LANDING GEAR BRACE & FLEX CABLES
"SANDAUS" CORDS.
WING-WALKS FOR PILOT BOTH SIDES OF COCKPIT.
25'7"
RED. BLUE. WHITE.
ENGINE: GNOME-MONOSOUPAPE, 160 H.P. AT 1200 R.P.M. 9 CYL. MONOVALVE ROTARY.
STATISTICS: REVOLUTION COUNTER-"CEIGER". MAXIMUM SPEED: 140 M.P.H.
THE WEYMAN EXHAUSTER WAS SIMILAR TO VENTURI-TUBE USED ON LATER AIRPLANES FOR TURN & BANK INDICATORS. IN THE NIEUPORT, THE VENTURI SERVED TO DRAW GASOLINE FROM THE LOWER TANK TO THE UPPER. AN EMERGENCY "GNOME & RHONE" HAND PUMP WAS PROVIDED AS 28.
SOME NIEUPORT 28'S WERE EQUIPPED WITH BOMB RELEASERS CARRYING 5 POUND COOPER BOMBS ARRANGED UNDER THE FUSELAGE PLUMB WITH THE LOWER PLANES. WINGS AS WELL AS FUSELAGE WERE METAL "PLATED" SO THAT WIRELESS MESSAGES COULD BE RECEIVED.
SPAN 26'10"
PROP DIA 8'6"
WEYMAN EXHAUSTER VENTURI TUBE.
STRUT BRACING CABLE.
SPLIT AXLE FLEX CABLE.
NOTE: THANKS TO THE U.S. AIR FORCE FOR DOCUMENTARY ASSISTANCE IN THE PRODUCTION OF THIS DRAWING. THE KINDNESS AND COOPERATIVE GOOD WILL OF CAPT. EDDIE RICKENBACKER IS VERY MUCH APPRECIATED. GENERAL OUTLINES WERE OBTAINED FROM TRACINGS ORIGINATING AT THE FRENCH NIEUPORT FACTORY. J. NEETS.
AMERICAN COCKADE INSIGNIA (RED OUTER RING, BLUE CENTER & WHITE DOT) WAS PAINTED ABOVE AND BELOW UPPER WING TIPS & ONLY BENEATH LOWER WING TIPS. COLOR SCHEME: PALE GREY FUSELAGE & WINGS, CLEAR DOPED. LOWER WING-WALKS, BLACK. MOST FRENCH NIEUPORT 28'S WERE CAMOUFLAGED WITH PATCHES OF LIGHT GREEN & BUFF ON THE UPPER SURFACES AND CLEAR DOPED UNDERNEATH.
WHEEL, GROUND POSITION.
5'
2'8"
FLYING POSITION
5'3"
AIR AGE INC. 551 FIFTH AVE. NEW YORK, N.Y.
SCALE: 1"=1'0"
DRAWN BY: Joseph Nieto.
GENERAL ARRANGEMENT. CAPT. EDDIE V. RICKENBACKER'S
Nieuport 28.

For Fun, Thrills, Excitement . . . Get

MONOGRAM'S Three Sensational NEW SPEEDEE-BILT models

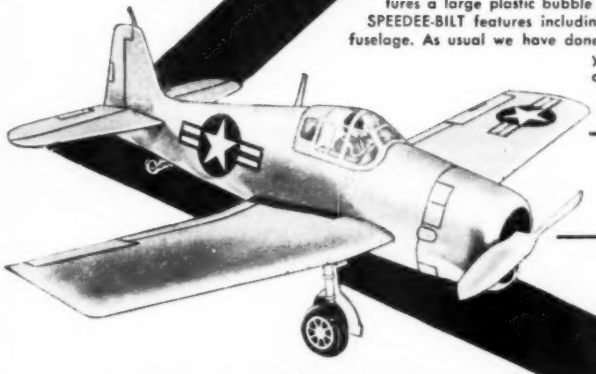
SEE THE PILOT IN THE PLANE

Republic Thunderjet F-84

One of the latest jet fighters. Capable of speeds in excess of 700 MPH. Kit includes all of Monogram's sensational features including formed wire parts and three-color decals. Can be powered with Jetex 50 engine. Only 75 cents.

The Models You Asked For

We just can't say enough about our three new SPEEDEE-BILT models. We know you will enthuse over them too because they are the models you wanted—the planes you asked us to bring out—and they are the most thrilling numbers in the entire SPEEDEE-BILT series. Just think of it, each of the new models has a plastic pilot to give you that extra scale realism. Each kit features a large plastic bubble canopy and other new plastic parts plus all of the regular and exclusive SPEEDEE-BILT features including speed construction with the patented Monofoil wing and precision-cut fuselage. As usual we have done all of the hard, time-consuming work ourselves but left all the fun for you. You'll enjoy building these new SPEEDEE-BILT models. You can finish one in an evening.



Only SPEEDEE-BILT Has Them!

Only SPEEDEE-BILT models give you the outstanding features shown here. And now you have twelve models to choose from. You can power your finished models with rubber, CO_2, Campus Bee, A-100 or the small gas engines.

Grumman Hellcat F6F

The popular carrier-based fighter that gave such terrific performances in the Pacific. The most notable naval fighter of World War II. This SPEEDEE-BILT model with all of its exclusive features captures the true realism of this remarkable airplane. Only 75c.

Ryan Navion

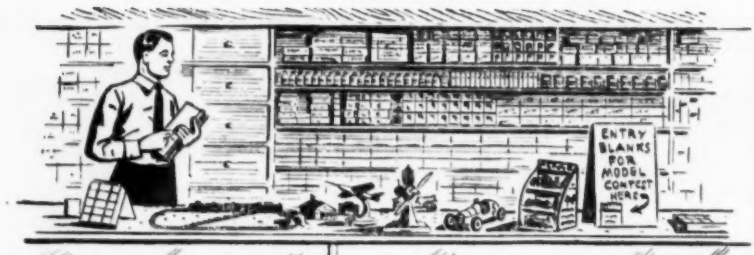
The newest 1950 version of this popular four-place airplane seen at most airports. Note the attractive and huge bubble canopy on our model. See how realistic is the pilot. You'll want to build and fly this new model right away. Only 75c.

Only 75 Cents Each

At Your Dealer

Ask for SPEEDEE-BILT models at your favorite store. If no store near you order from address below. Add 25c for postage, packing and shipment from nearby dealers stock.

MONOGRAM MODELS, INC. 225 N. RACINE AVE. CHICAGO, 7



HOBBY COUNTER

Conducted by THE TRADE OBSERVER

CONFIDENTIAL talks with motor manufacturers at the Dallas Nationals indicate a sensational year coming up. Major engine builders have secret projects in .049's, .19's, and .29's. People who have not made engines before will enter the competitive picture. However, it is too early to release details. O & R's traveling salesman, Ray Bryan, briefed us on their new marine engine, based on the .29 auto engine. These are not the regular aircraft engines, but are made to withstand the rough usage in their own special field. The marine engine has a ball thrust bearing in addition to O & R roller bearings. O & R may go into the production of stuffing boxes, universals, fly wheels and perhaps propellers.

* * *

Only a moment ago we were block testing a batch of new baby engines, including the *Wasp*, an .049 at $5.75, by Atwood Mfg. Co. (Pico, Calif.); the K & B .049 at $5.95, by K & B Mfg. Co. (224 East Palmer St., Compton, Calif.); the *Spitzy* .045, at $3.95, by Mel Anderson Mfg. (1819 Third Ave., Los Angeles, Calif.); and the *Cub* .049 engine kit at $4.75, by Herkimer Tool & Model Works, (209 Harter St., Herkimer, N.Y.). On our scout's honor all are swell jobs. The big improvement in small engines has been the tank. In the beginning you were left holding the bag on that, and tanks were pretty hard to mount with some designs. On the *Spitzy* the tank is cast integral with the crankcase. Very clever timer tanks are used in both the *Cub* kit and the *Wasp*, also serving as engine mounts. We just had a junior starting all four engines mounted side by side on a box. All started easily and packed a real wallop. The *Cub* kit just falls together.

* * *

Testor Chemical's (Rockford, Ill.) *Senior* will set a new high in prefabricated construction. At least two revolutionary developments are involved. One is the forming of balsa shells that have compound curves. The other is a radically new method for keying bulkhead and rib construction for perfect, automatic alignment. The *Senior* fuselage is probably the easiest-to-build streamlined fuselage to hit the market. Big news at Testor's is the use of the Walker control system in the future. But the U-Control patent situation is further snarled by the innovation of flaps, and these are to be used on the *Senior*.

* * *

Have some remarkable new kits in stock. At $5.95, Dmeco's (Williamsville, N.Y.) *Speedwagon 50* is a buy. Among its features are a pressure cowl to reduce cylinder drag and add a jet-assist effect, full length maple crutches, with a finished steel reinforcement—holes drilled and tapped—for mounting the engine. A pressure fuel system eliminates waiting for the engine to come in, according to the manufacturer. Fabric covered balsa provides lightness necessary for high-speed flying. Plans give dope on reworking a .60 to fit in this small model. SPEED NOTES, a 4,000-word booklet by Harold deBolt, deals with engines, tanks, fuels. The balsa is good quality, proper grades depending on use, and accurately cut. Span is but 15", area 42 sq. in., and the ship is capable of 150 mph, depending on power. Engines either a *.49* or *.60 McCoy*. If you want to get into high speeds, here is the kit for you.

* * *

Another kit, notable in a different way, is the Polish Fighter, by Sterling Models (Philadelphia, Pa.). At $4.95, it spans 36", and takes B, C, and D engines. When Sterling says prefabricated, they mean it: you get carved gull wing leading edges, carved lower fuselage, shaped trailing edges, die-cut ribs, bulkheads, tail surfaces, plywood parts. All the balsa covering is die-cut, and there is a special spun aluminum spinner. Ever since 1930 *some* manufacturer has had one of the ever popular Polish fighter kits, but this tops them all. If you like scale—and scale that will fly—you shouldn't miss this one. Would like to enter a scale event ourselves with a Sterling Polish Fighter.

* * *

After one of the Little Rock speed fliers told us of good results with a new *Fox*, we contacted Duke M. Fox, of Arnold & Fox Engineering Co. (7401 Varna Ave., N. Hollywood, Calif.), for the inside story of the .29 racing special. Developed from the earlier 29 and 35's, the *29 Special* really cooks with gas. Its porting has been modified, balance improved, a new bearing and piston added, resulting in a peak of .8 hp at 18,000 rpm. Test models have been run continuously for one-hour periods at speeds in excess of 30,000 rpm. This means that occasional running wild with a broken prop will not harm the engine. Speeds of 140 plus have been reached in models conforming to AMA rules. The engine is said not to be too hot or temperamental for the less experienced speed flier. Price is $1 higher than their standard engines, or $12.95.

* * *

A. L. Davenport, Pactra Chemical Co. (524 S. Spring St., Los Angeles, Calif.), fills in the background on the purchase of Victor Aerosearch, the makers of *Aero Gloss* Hot Fuel Proof finishes. The formula has not been changed, and it is stated that *Aero Gloss* is a true airplane dope that is entirely fuelproof, not just a proofer or synthetic rubberized finish. According to Joe Wagner, *Veco* free flight kit designer who ran tests for Mr. Davenport, one of the most widely known and best fuels on the market cuts through most proofers and finishers. *Aero Gloss* is one dope that proved impervious. Fifteen colors are available, plus clear.

Pactra has three hot items you should test. One is their balsa filler coat, which will not shrink and which really prevents grain images on the finished work. Another is their C-7700 Fuel Proof Cement, which resists hot fuels and, according to the manufacturer's claims, is the only one now available to prevent structural weakness without use of proofers. Lastly, there is Plastic balsa, a fillet material that looks like balsa, is as light and as strong as balsa, and which prevents the gouging of nearby surfaces when finishing, as happens with

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1950 NATIONALS
WINNER!

Perfection in Free-Flight!

Dennie Davis'
MINI-HOGAN "34"
34" Wingspan Class "½A"
For .035 to .074 Engines
$1.95

MINI-HOGAN "45"
45" Wingspan Class "A"
For .074 to .099 Engines
$2.95

- PRECISION "CLEAN CUT-OUT" PARTS
- COMPLETE HARDWARE
- "SILKSPAN" COVERING
- SHEET BALSA WING COVERING
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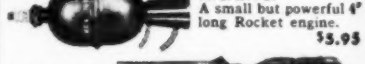
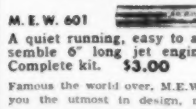
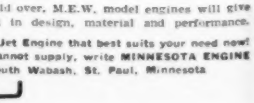
THERE'S A M.E.W. JET ENGINE
TO FIT YOUR EVERY NEED



M. E. W. 307—A powerful, easy starting, 26" long jet engine for the big ones. $9.95



M. E. W. 707
A small but powerful 4" long Rocket engine.
$5.95



M. E. W. 601
A quiet running, easy to assemble 6" long jet engine. Complete kit. $3.00

Famous the world over, M.E.W. model engines will give you the utmost in design, material and performance.

Get the M.E.W. Jet Engine that best suits your need now! If your dealer cannot supply, write MINNESOTA ENGINE WORKS, 218 South Wabash, St. Paul, Minnesota

harder plastic woods commonly used. I stock *Aero Gloss* so you should be able to get these items from your own dealer.

* * *

Finally had chance to chat with Wallace Francisco, Francisco Laboratories (3787 Griffith View Drive, Los Angeles, Calif.), about the proper use and care of fuels. Francisco's efforts have been concentrated on overcoming variable volatane control necessary to obtain high efficiency of combustion; elimination or reduction of other troublesome factors, particularly spoilage of glow fuel (common when not prepared with properly inhibited detergents in proper containers). Specially-made containers, special chemically treated castor oil to prevent acid fat deterioration, nitrates fortified and treated to prevent spoilage and danger of shock explosions, were among the developments. Francisco claims the most powerful fuel nitrate made for racing fuels is their *Hypo-Nitrate* used at both Indianapolis and Daytona Beach. It is over 90% nitrate concentrate, packaged, nevertheless, safely and without spoilage. The only thing for you to keep in mind is that fuel should be stored in moderately cool places and capped air tight.

* * *

Having trouble with plugs that fit deep into cylinder head depressions—the kind that won't permit your plug-wrench to come to grips? If so, Forster Brothers (Lanark, Ill.) have a precision tool, made of steel (not a stamping) that sells for 40c. Has two openings, one a 5/16" hex and the other a ⅜" hex and will fit all plugs on A and B engines. Forster also has a new short propeller drive washer (30c) for use with their new *G-29* and *G-31*.

* * *

The rapid development of stunt model design has left high and dry a great many excellent kits which fall just short of contest-winning performance. Until recently, these "old" kits have been slow sellers in our shop. But now some of the smarter builders have discovered how to modernize almost anything with wings. If you happen to own one of these "outmoded" ships or can get one of the dust covered kits at a bargain rate, it will pay you to try some of these tricks. The trend has been to more and more wing area, and shorter moment arms. These two factors tie-in for top maneuverability. Then the flap deal of *Veco* (Henry Engineering Co., Burbank, Calif.) really does things for a stunter. Boys I talk to are getting results on old ships by adding to the span, and the chord if the wing was narrow, shortening the fuselages, and adding flaps. In fact, they have gilded the lily by adding 2" to each side of the wing on such modern stunters as the *Chief* and *Warrior*, and increasing the flap chord (only with this addition) by 50%. As a rule-of-thumb, limit the flap movement to about 15° when flipper movement is about 40°. *Veco* has an excellent control horn which can be used for flaps, since the horn itself might be mounted in the body with the extensions for elevators going out to each flap instead. There are at least a dozen "oldie" kits that will kick up their heels with these modifications. The *Veco* horn is intended for use with their large bell-crank, using the inside hole of the crank for best results.

* * *

The demand for free flight jobs in my shop—well, I'm flabbergasted! It's the same all over. The ads are full of F.F.'s. That's what the little engines have done. Can't begin to tell you everything about the flood of kits coming in. A random example: chatted with Jerry Brofman, Enterprise Model Aircraft & Supply Co. (5107 Avenue D, Brooklyn, N.Y.) His *Half-A Shadow* (150 sq. in.) went over with such a bang, that Jerry has gone back to the board himself to create a 202 sq. in. ship for contest performance on .074-.099, or for precision flying on smaller engines. This will be ready by early fall, 'tis hoped. Probably will be called the *Champion*.

At Enterprise, the baby engine boom has had startling results. First, the *Nifties*—and the response to these little fliers has exceeded everyone's wildest expectations—

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EASY TO BUILD! BRAND NEW! TOPS IN VALUE! TOP-NOTCH PERFORMERS! BRAND NEW! COMPLETELY PREFABRICATED

Authentic FLYING SCALE MODELS

SPECIFICATIONS
SPAN.....22 in. AREA..... .64 sq. in.
LENGTH....14½ in. WEIGHT.....6½ oz.
ENG. DISP... .020 to .074

"½ A" U-CONTROL MODEL AIRPLANES for SMALL BORE ENGINES

$1.95 each

• PIPER CUB Special •
• STINSON VOYAGER •
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ALL PARTS FINISHED • NO TOOLS REQUIRED
COMPLETELY PREFABRICATED

Genuine Carved Balsa Fuselage
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Accurate Die-Cut Tail Surfaces
Rubber Wheels plus Complete Hardware

The Fleet's In ... with these famous SCIENTIFIC BOATS!

"CO_2 SQUIRT"
The Squirt is ideal for powering with a CO_2 motor or any of the new infant engines. Complete kit contains die-cut parts, metal flywheel and propeller, shaft, housing and rubber universal joint. All necessary hardware, etc. The Squirt measures 12½" long with a 4" beam.
$1.50

"BUCKEYE JR. SPEEDBOAT"
13½" long, 4" beam. For all small bore engines. .020 to .099. Kit contains brass prop., shaft and housing, brass flywheel, decals, plastic windshield, rubber universal, complete hardware.
$3.95 HULL CARVED

"BUCKEYE SPEEDBOAT"
17½" long, beam 5". For .099 to .29 engines. Kit contains carved hull, die-cast propeller, housing and shaft, hardware, decals, etc. Easy to build and operate.
$4.95 CARVED HULL & DECK

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Buy from your dealer & save 15c mail charge

SEE THESE SCIENTIFIC MODELS AT YOUR FAVORITE HOBBY SHOP

SAVE $1.20

Assemble it yourself!

Complete instructions — anyone can assemble this engine in 15 minutes. All engine parts precision machined.

.049 CUB POWER KIT

OK

.049 O.K. Cub	$4.95
Fuel tank and engine mount with neoprene tubing	.50
Propeller	.25
Spin Starter	.25
... and a BIG VALUE @	$5.95
NOW! Your Cost ONLY	4.75
YOU SAVE	$1.20

75¢ PINT

"OK" GLOW FUEL

Dynamite in Every drop!

An improved fuel that gives you easier starting, smoother operation and higher speeds. A methanol base fuel, heavily fortified with nitrates. Ideal for break-in purposes, "OK" Glow Fuel is especially designed for use in ALL "OK" motors.

Interchangeable "OK" CUB SERIES

Outstanding "Half-A" for free flight and indoor flying.

Outstanding for its stunt and speed flying performance.

Outstanding for its rugged, powerful Class "A" performance.

Fitted with the new, sensational "OK" Glow Plug, each Cub delivers the top performance for which it is designed. Easy to start . . . full surge of smooth power within size limitations . . . yes, up to 15,000 rpm with the .099 . . . and, of course, the proper fuel. Unique patented port design pat. No. 2,179,683 provides radial fuel injection, contributing to higher turbulence, more effective scavenging and higher power weight ratio.

"OK" CUB Combination Package

Here is the complete power plant for your plane at a price! Included is your displacement choice of "OK" Cub engine (assembled); propeller, wedge type fuel tank and neoprene tubing. All you need is your "OK" Glow Fuel . . . and you're ready to set her zooming!

.049 *Only* $5.75 .074 or .099 $6.75

Visit your favorite hobby shop today — or for further details write to

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2010 Harter St., Herkimer, N.Y.

have been flown around the pylon, free flight, and controline with *Infants* for power. One fellow managed to do 3 mins. with the Aeronca on 15 secs. motor run.

* * *

RANDOM NOTES: On my counter stands a card, or Prop Chart, which, as a dealer, I got from Top Flite (2635-45 Wabash Ave., Chicago, Ill.) for one thin dime. Aside to fellow dealers: for 25c you get the chart plus two mounted 6" props. This chart shows all prop diameters and pitches in both *Top Flites* and *Power Props* for every engine from the *Campus Bee* up to a *Dooling 61*. If you have a prop-size problem, don't hesitate to come in and consult the chart. . . . Watch *Top Flite* this fall for more kits based on *Jigtime* construction, as used in the *Lil' Rascal*. Cute ½A pylon kit called the *Thin Man* by Contest Craft Company (4505 Queensbury Rd., Riverdale, Md.). Cost is $1.95. Prefabricated, and includes timer tank . . . If you want a fast cement, Comet Model Hobbycraft (129 W. 29 St., Chicago, Ill.) now is putting out for a dime an additional cement item with extra fast drying characteristics. This cement dries clear and really holds tight.

Scrap Box

(*Continued from page 2*)

cannot be spun. Using the new *Citizenship* radio just approved by FCC he ran up 60-odd points just on his first 5-min. flight. Handicapped by winds for the rest of the meet, no one could duplicate his performance . . . The Navy bomb dropping event interesting to watch. Bombing very accurate. Jim Schenck bombed the judges. Good idea, that. They had run out near the target, forgetting the purpose of the event. Trying to make take-offs within 100' in this event in that wind ended in models tearing around the intersection of two runways exactly like those jack rabbits . . . Those Texas accents! One youngster pranged his gassie. A sympathetic woman in the crowd called out, "Young man, your flitter mill broke?" Dave Call, Philly, coined a new free flight phrase: wing unloading.

Wind raised hob with stunt. Low-powered, big area jobs had their troubles. Even the great Palmer pranged one. So did virtually everyone else. High powered, fast jobs frequently dived in during pull-out—so you take your choice. In open stunt, the run off was something for the books. Lew Andrews took first, pushed by Palmer, de-Bolt and Shulman in that order. Windy weather stunting is toughest on spectators. Personally, we can't take it . . . Teamwork of Little Rock boys in speed should be preserved in movies. Three guys start every model. One handles starter. One the booster leads. Doc Warden, just about the most colorful guy ever to hit speed, tunes all engines. When he releases, he runs to side of circle, kneeling pad in hand. When he judges ship is at maximum, waves pad at guy near judges. The run over, he waves pad again and strides off for next ship. Real bang, bang procedure. Little Rock heavily criticized for this but all clubs should do likewise. Those guys really worked for what they got . . . The Grish brothers hit 137.88 in B Open, some 13 mph better than second-place Jones, of Little Rock. Featured a good pressure tank, a perfected development of an idea tried and dropped by other builders . . .

Navy carrier event had few entries but was the show of shows. Novelty events on Sunday afternoon made real hit with the crowd that always gangs up on the ukie scale run-off. We predict the success of this event. The crowd was so quiet you could hear the wind whistle around an indoor model.

R.O.W. distinguished by heavy entry list, rough water, and excellent flying. Many jobs dunked due to the waves but others, having wide floats, skipped the wave tops and zoomed aloft. Taibi, using old fashioned twin floats of the scale type, had a *Pacer* that ploughed through wave after wave to get off. The ship would almost stop in its tracks, throwing water, then would zoom off. The big thing was launching know-how. At the navy carrier event, a good half mile away, a steady stream of R.O.W. jobs went

gliding by at low altitude. Fascinating. One thing everyone noticed—very, very few R.O.W.'s wound in. Whatever the reason, it could well be adapted to free flight. Up wind, well out in the lake, down came a curious free flight plane and ditched in front of the R.O.W. event. Out went the crash boat . . . Warnings about water moccasins didn't phase the model builders who followed their ships into the drink. 'Twas said that the reptiles had wisely retreated to the other side of the lake. Bright idea: celluloid float bottoms for detecting leaks.

Finest thing in a Nationals: 15-year-old Leslie Bartlett, San Diego, ran up more points than any other contestant and took the Championship. Also the fourth year in a row for California. Young Bartlett got a first and two seconds in free flight alone.

Harry Geyer, Beacon Electronics, had a mysterious gadget atop his car. This was a wire cage which could be set up like a tent. If you took your radio equipment inside the tent, you could test while other ships were in the air. Signals would not leak through. Before the meet was very old, Geyer was reputed to have a trained buzzard in the cage. Said bird was trained to pounce upon competitor's radio jobs . . . When some kid vanished on the horizon in pursuit of a gas job the flier was heard to say, "I don't care about the model but I sure hope they have a name and address on that kid." Calmest competitor: Dick Korda. The old man takes a year and a day to wind, looks the whole ship over before letting it go. That includes the fuse, wing rubbers, alignment . . . Can't wait to see what happens when the hot-shot modelers discover they can fly radio. This gentlemen's event will be chaos with rabid fliers on the line at nine to wake up the judges. Their skill in design is much needed. . . deBolt in stunt. Flying one of those "bombers" with a hot .60. Smoking a pipe while the ship flew like crazy. Like a mother hen and chicks with his juniors. "You boys don't fly my airplanes," he'd tell them. Any modeler can do better than any other modeler, if you know what we mean . . . H. A. Thomas in a tiny Crosley station wagon being chased by a free flight winding down into the runway. Each time the gassie would swing by, you could see H. A. duck inside the Crosley. On the third pass the free flight clobbered the little car . . . Victor Stanzel flying Mono-line. You'd rub your eyes. On a 100-foot line, his *Tuffy* looked and flew like a free flight.

At night, the radio boys would adjoin to a near-by airport. The show there was even better than at the Nationals. One night, MacNabb and Foxworthy tried formation flying on two frequencies while a third job was doing high spins on a third frequency. Future events will see simultaneous flying. A Texas boy had a *Drone* job on a test flight. So quiet no one knew it was up. Meanwhile Geyer was demonstrating the "beep box," a control-stick deal that enables rudder alone to do things like chandelles. The poor Texan was having a rough time, zooming and diving all over the place until he caught wise . . . the untold story was told at Dallas about the pay load flight across the Rio Grande several months ago. The guy that retrieved the model forgot to take out the payload and the stop-watch cargo was carted back to the U.S.!

Had trouble getting the dope. Everyone wanted to tell us funny stories. You'd think the biggest Nats prize was a subscription to MODEL AIRPLANE NEWS. The best story heard at the Nationals concerned the last Mirror meet. Seems that Charlie Hamilton, a modeler from Bayonne, New Jersey, entered free flight. He fired up his A job, tilted up the nose and was turning the needle valve for climb when, out of the corner of his eye he spotted another job winding right at him. Charlie rolled with the blow, dropping his ship. The next thing he knew the timer informed him he had 18 secs. When Charlie let go his model it bounced off the runway, took off cross wind and spiraled in. Tie that, you hard luck modelers. For consolation, Charlie, you win the free subscription for the best tall but true story of the month.

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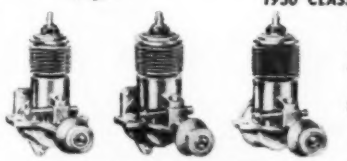
- Record Breaking Performance
- Every One the Value Champ in Its Class



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.049—for indoor flying, sports flying and free flight $4.95
.074—for stunting and speed flying..... $5.95
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Special Combination Packages—OK Cub .074 or .099 plus propeller, switch type gasoline tank and neoprene tubing $6.75
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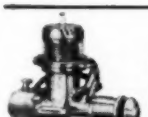
"OK" Bantam Glow Plug Model—A better-than-ever edition of the famed record breaker. Designed by noted engine designer Ben Shereshaw. Weight 3¼ oz. with range from 2,500 to 11,500 rpm. Complete with glow plug, less tank **$7.95**
Spark Plug Model—Complete with plug and tank $9.95

1950 CLASS "B" LEADERS



"OK" Hot Head Glow Plug Model—New features include ebonized cylinders, gold anodized high-compression cylinder. Complete with glow plug and tank.... **$9.95**

"OK" Super 29 Spark Plug Model — Complete with aluminum tank and spark plug $11.95

1950 CLASS "B" BARGAIN OF THE YEAR

"OK" Mohawk Chief Glow Plug Model—A high quality precision engine in the low price field. Superbly engineered—features high grade metals and alloys. Block tested with full 60-day guarantee. Complete with glow plug and tank **$8.50**
Spark Plug Model, with plug and tank $9.50

1950 CLASS "D" LEADERS

"OK" Super 60 Glow Plug Model—With new ebonized cylinder, gold anodized cylinder head, aluminum crankcase, large ball-bearing. Complete with glow plug and tank **$9.95**
Spark Plug Model, with tank and plug $11.95

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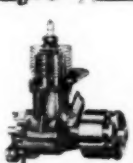

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World War I

(*Continued from page 17*)

(numbered from the firewall) plus a vertical sternpost. Upper longerons were spliced between the sixth and seventh uprights, the size being reduced aft, and the lower longerons were spliced between the fifth and sixth uprights. Each splice was surrounded by a stamped steel sleeve held by through bolts.

A heavy diagonal member ran from the lower end of upright 1 (firewall) to the upper end of diagonal 2. Through this diagonal passed lateral steel fittings which held the rotary engine's rear bearing and magneto. Upright 3 was about twice the cross section of standard members, was routed to an "I" section, and carried compression loads from the rear landing gear struts. Uprights 1 and 3, also carried on their upper extremeties, fittings for the center section struts, and on their lower ends, fittings for landing gear struts.

These fittings, as well as those for all other vertical and lateral fuselage members, were stamped steel, and each bay was braced with steel wires tensioned with turnbuckles.

The rotary engine was covered with a one-piece cowl, at the bottom of which was a small section that could be removed for inspections or adjustments. This removable piece was sometimes left off altogether, especially in warm weather. The cowling otherwise was formed of four larger segments riveted together, and attached to the fuselage with luggage-type buckles.

Roundness of the engine cowl was tapered off by a series of formers and stringers and finally flattened out at the cockpit, from which the fuselage sides were unfaired aft. The fuselage bottom was left flat but the upper deck allowed the cowl section to continue to the cockpit, then taper off to the rear until it finished horizontally flat at the stabilizer. This form was maintained by formers and stringers also. Fuselage sides, back to the second upright, and the upper deck, back to the fifth upright, were aluminum covered. The upper deck in front of the cockpit was cut out to permit installation of the single Vickers forward firing machine gun. Both side cowls were equipped with inspection panels which gave access to the ignition and fuel systems. The balance of the fuselage was fabric covered.

The landing gear was made of right- and left-hand "V's" of streamlined steel tubing attached to the previously mentioned fuselage sockets and separated by a metal spreader bar. The axle was a split type, joined in the center, and adjusted by a vertical bracing wire. Rubber cord took up the landing shock. The landing gear was stiffened by crossbraces of steel streamlined cable. The tail skid was wood, likewise sprung with rubber shock cord, and was steerable.

Cockpit of the Sopwith *Pup* was devoid of any of the niceties that became standard in later and more advanced aircraft. The pilot's seat was located only a couple of inches off the floor, so he had to sit with his legs nearly straight out. The control stick was therefore very short. The pilot sat with his head just high enough to see out and downward, and was well protected from the wind by a generous windshield.

Inside, the cockpit was uncluttered, but a little cramped. Instruments were rudimentary, consisted of an airspeed indicator, an altimeter, a tachometer, a clock, and a compass.

Sopwith *Pup* wings were of equal span, and were identical except that each lower panel contained one additional rib to make up for the lack of a center section. In both planes two "I" beam box spars were used, connected by steel tube compression members and crossbraced with steel wire. Ribs were made of plywood webs with spruce capstrips, attached to the spars with glue and small blocks of wood nailed into place. Leading and trailing edges were wood.

Ailerons in both wings were identical and connected by an aileron wire. Their area totaled 22 sq. ft., or about 10% of the total wing area.

The center section, to which the upper wings were attached, was flat in front elevation, held off the fuselage by four outward splayed spruce struts, and wire braced. Center sections in some *Pups* were covered with a transparent material, some were fabric covered, and some were left open. The lower wings were attached to a short wing stub which protruded slightly outside the surface of the fuselage covering in that area. Both wings were rigged to a dihedral angle of 3°, positive incidence of 1½°, and positive stagger of 18". Gap was 4'5", and there was neither wash-in nor wash-out.

Interplane struts were four in number—two right and two left—and were made of spruce. Steel shoes on their extremities fitted into spar sockets.

The *Pup's* empennage consisted of fixed horizontal and vertical stabilizers, with unbalanced movable surfaces. Their structure was of wood, except for steel tube main spars, and horizontal stabilizers were both adjustable and fixed, depending on the model and purpose. Tail plane incidence on the 80 hp model was 1½°, and for the 100 hp model, was 2½°.

Sea Type Pup. Because of its slow-landing and flying speeds, the *Pup* was chosen for deck landing experiments by the British early in 1917. H.M.S. *Furious*, which had been unsuccessful as a cruiser, was converted into an aircraft carrier with a take-off deck forward, and a landing deck aft. Taking off was normal, but landing was accomplished in two ways. First, the carrier *Pup* was fitted with skids instead of wheels, and when it landed, it slid into a barrier made of vertically strung ropes. An arresting gear, as we know it today, had not yet been developed. The second method is illustrated with this article. With the carrier cruising into the wind, the *Pup* made its approach. When in the correct position, the pilot would chop the throttle and as the plane settled, a sturdy ground crew would run out and haul it down with the straps provided for the purpose!

The straps also served to keep the *Pup* on deck if the *Furious* were heading into a stiff wind, because if the relative wind were more than 35 mph, the airplane would start flying!

Like all other types, the *Pup*, land and sea types, was replaced by better ships—more powerful, faster, quicker and higher climbing—but this little plane will always remain popular with aero enthusiasts as it was with the men who flew it nearly 35 years ago.

Report from the West

(*Continued from page 8*)

record flight in Class D of 153.78 mph with his *Dooling*-powered original speed job. He was ably assisted by the old "maestro" himself—"Zip" Grandel, his dad. The Grandels have always been a combination to beat at any contest in which they fly. Dick Rigney, of Long Beach, had a Class B *McCoy* ship that was no larger than a minute, and he turned in a flight second to none in that class. Our good friend Lew Mahieu did the ground work for Dick. The lad who stole the show in the U-control circles, for our money, was little Dennis Alford. Dennis thoroughly "waxed" everyone in the stunt competition. He's the seven-year-old lad we told you about a few issues ago. We would like to go on record as stating that we doubt if anyone in his age bracket can come close to his grade of stunt flying. Young Alford missed a bid to the Internat's, but he has lots of time to make the trip. We might add that he also copped a first in speed and a third in ½A free flight.

It was noted that several of the free flight boys have invaded the U-control circles and vice-versa. We are always happy to see these "invasions." Ronnie Truelson showed up with a mighty fine looking scale Goodyear racer that he had just completed. The ship had never been flown, but Ronnie did a swell job and took home the first place hardware in the flying scale event. Young Truelson had a bit of trouble with one of his free flight jobs. It seems that he had built a few ships, had them all worked out and proceeded to put them away for this

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big event. Just before flight time, one of the small lads in the neighborhood used the fuselage on one of these precious ships for an accordion. What a life!

Les Bartlett and Larry Goodale, two San Diego modelers, took top points in the free flight and U-control events respectively and gathered in two more of the elusive bids to the Internationals. Les won the Junior Sweepstakes award and Larry, the Senior Sweepstakes award. These two lads, along with Richard Allen, managed to walk away with the "lion's" share of the beautiful hardware donated by the Southern California Plymouth dealers. John Kieren handled the C.D. duties here.

The final Sweepstakes winners at this big event were: *Freshman*—Richard Allen; *Jr.*—Leslie Bartlett, John Brodbeck, Jr., Dwight Miller, Bob Turner; *Sr.*—Larry Goodale, Dwain Varner, Bill Poesch.

The *F.A.S.T. (First All Speed Team) Club*, staged another of its excellent team speed events at the Santa Anita lot. We are always amazed at the precise way in which these modelers fly. The close formations that are held throughout the race and the even speeds at which the planes fly, make their races very exciting to watch.

* * *

We had a bit of a chat with J. M. Bollinger, of Long Beach, who gave us some dope on a new association that is being formed in California. The following model clubs are very much interested in the new association: *Los Angeles Thermal Thumbers, Los Angeles Flight Masters, Long Beach Thunderbugs, San Bernardino Flying Wheels*, and the *Van Nuys Valley Hawks*. The idea of the whole plan is to promote quarterly meets, and once a year, the combined efforts of members of the association will be consolidated to sponsor a terrific combined U-control and free flight meet. With the many clubs that will undoubtedly join this gathering, model flying should reach a new high out West. Conflicting dates for smaller contests in the above areas should be held to a minimum. Sounds like a very good idea. Any of you other clubs that are interested in receiving information about this new association should contact J. M. Bollinger, 41 Platt Street, Long Beach 5, California.

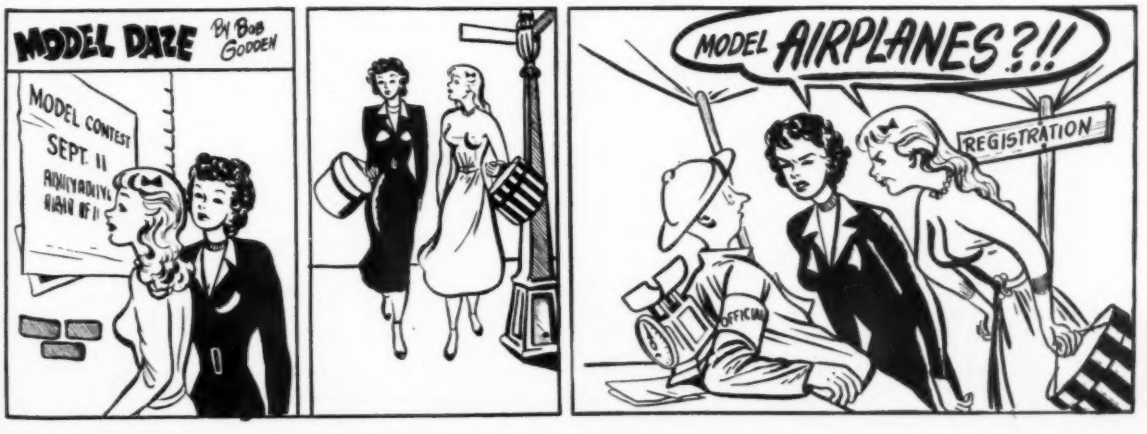
* * *

We received a bit of humor from our friend Jim Walker, up Portland way. We'll let Jim tell it in his own words. "This story is the one about the lawnmower" (Jim's famous radio controlled lawnmower) "in the parade at Olympia, Washington. It was a Centennial, and of course they had a lot of horses in the parade ahead of me. I was running the lawnmower down the middle of the street, going through intricate maneuvers, and from time to time dodging certain obstacles in the street. However, at one time I became too concerned about the boy who was launching planes off the roof of my car behind me and was not watching the mower closely enough. I turned around just as it was going 'chunk-chunk-chunk' through a nice fresh deposit, with me walking only a few feet behind it. I was, of course, liberally sprayed, and since it happened right in front of a theatre, one of the spectators laughed so much he fell off the marquee into the crowd below. I understand they took him to the hospital. . . !

* * *

Mom and Pop Robbers sent us some more information on the activities being held in northern California. The San Francisco Area PAA-Load contest was held at Jerusalem Field, and Pop Robbers, contest director of the meet, started the official flying at 9:00 a.m. "Gordie" Peterson weighed each ship before every flight and kept the fliers happy and the timers busy by not letting the ships sit on the ground. Everyone had all of his flights in by 2:30 p.m., and their checks in their pockets. Naturally, the contestants were either doing an Indian victory dance or the usual "if I'd only gotten one more decent flight" statement was floating around. The day was perfect. Jim Stark and Vernon Rossow, of Mountain View, turned in flights of 9:53.2 and 10 mins. respectively on one of the rounds. John Lenderman and Harry Robison, of the *Stockton Gas Model Association*, did a large part of the timing with the help of fliers who had completed their official flights. Mom and Pop also timed, in between the registering and recording duties they always assume.

Results: *Class A Jr.-Sr. Division*—Bruce Hannah, 10:20.8; *Class A Open Division*—Jim Stark, 13:00.0; *Class B Jr.-Sr. Division*—Miles Loyd, 4:54.8; *Class B Open Division*—Joe Biligri, 11:08.2.



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Skimmer XC-1

(Continued from page 21)

Colonial Aircraft Corporation, of Huntington, Long Island, New York, hopes to set that situation right with our Plane of the Month. The *Skimmer* XC-1 offers better performance at greater economy than even the successful *Seabee* and its design overcomes some of the faults of that airplane. The *Skimmer* is small, light, and efficient and in production should cost no more than comparable land planes.

Colonial Aircraft began back in December, 1945, with a group of Long Island aircraft workers headed by David B. Thurston, a guided missile project engineer at Grumman Aircraft Engineering Corporation, Bethpage, Long Island. He and other Grumman and Long Island engineers worked evenings and on week-ends for the next nine months designing their concept of not just the perfect amphibian but the perfect personal aircraft as well. By September, 1946, they had completed their drawings and enlisted the aid of several expert sheet metal workers. All of them tossed in what money they could spare, and began actual construction of their dream airplane. Working without haste and only in their spare time, the team finished the airplane in July, 1948, and immediately took to the air in their creation, from the Babylon Seaplane Base on Long Island.

Unlike most "backyard" groups who build airplanes, the Colonial group did not produce simply a device that would fly but rather, a professional job of designing an advanced type of amphibian. For example, the design of the cabin follows those principles laid down by the Crash Injury Research group on the basis of their wide studies in this field. The seats are built integrally into the aircraft structure, instead of being attached to the "floor" by screws or bolts as in many previous airplanes. This means that regardless of what happens the seat will not pull loose and toss the occupants forward. The control wheel is designed to fail in a progressive and predetermined manner. This feature is one of the strongest recommendations of the Crash Injury group and the constant hazard of being thrown onto the shaft of the control wheel in a crash has been a menace for 20 years. In the *Skimmer*, the control wheel gradually bends forward as the weight of the pilot puts a load of 6G or more on it, thereby "easing" the pilot forward without serious injury.

The instrument panel is so located that the occupant's head clears it, as measured in a forward arc from the seat safety belt, and shoulder strap provisions can be incorporated to prevent the occurrence of forward movement in the first place. The entire cabin structure has been designed in such a way that there are no protrusions in the way of the occupants' head or body in the event of a crash.

The *Skimmer* is of all-metal construction. The wing is mounted at the shoulder of the fuselage and is full cantilever. It supports the retractable landing gear, which folds inboard and upward into the lower surface, and the floats, which are fixed on the wing lower surface about three-fourths outboard from the root. Because the *Skimmer* sits so low, struts are not required for these floats and the added weight and complexity of retracting mechanism is avoided.

Careful attention was paid to the aerodynamic design of the wing to give the airplane not only high performance but good low-speed stability as well. The wing has an area of 156 sq. ft. and features straight leading and trailing edges and square tips, making for ease of manufacture. Slotted flaps are used extending along 80% of the wing-trailing edge, affording exceptionally low-landing speed. To accommodate these low speeds and still retain adequate control, the designers incorporated 2° of washout in the wing (the tip operates at an angle-of-attack 2° lower than the root) to insure that the stall starts at the wing root and that the aileron area at the tip continues to function for an additional 2° of angle-of-attack. As a further aid to stability and control, the differential aileron control gives the ailerons a motion of 40° when moving up but only 5° when moving down. Thus adverse yaw created by aileron deflection is reduced to a minimum and this combination of wing aerodynamic features are said to give the *Skimmer* good lateral control not only up to but through the stall! The designers say that the *Skimmer*, when properly trimmed, actually takes off and lands on the water by itself. The flaps are hydraulically operated, the hydraulic system being energized by an electrically-driven pump.

The landing gear includes one of those "why - didn't - they - think - of - that - before" features in the arrangement of the nose wheel. The nose gear retracts forward into the nose of the hull and the rubber tire projects forward of the nose in the retracted position to provide a bumper when floating into docks. As an economy move, all three of the wheels are the same size: Goodyear 6.00 x 6 and the brakes, tires, and wheels are all made by Goodyear. As an indication that the design group has been quite serious in its ambition to produce a full-production airplane without skimping on details, the landing gear struts were especially built by Electrol to Colonial's specifications.

The prototype *Skimmer* was powered by a Lycoming 0-235C-1, producing 115 hp for take-off and rated 108 hp at 2,600 rpm at sea level. This spring, however, the group decided to add more power and installed a Lycoming 0-290-D engine rated 125 hp at 2,600 rpm at sea level. Flight tests with the new engine have proved its improvement in performance of the airplane without substantial cost in fuel economy, and Colonial has "frozen" the design for production with this larger engine. The engine drives an Aeromatic automatically variable pitch propeller having a diameter of 6' 1". Engine and propeller are mounted pusher-style but many of the aerodynamic inefficiencies of the usual pusher installation are avoided in the *Skimmer* by locating the power plant on a vertical boom well above the wing. This pylon mounting avoids not only the turbulent wake of the wing on the propeller but simplifies the location of cooling air intakes, which is simply an inlet in the nose of the engine nacelle instead of complex ducting required when the engine is mounted directly in the wing-trailing edge. The engineers were well aware of the potential dangers of having this concentrated weight located above and behind the occupants' heads so they stressed the pylon for an ultimate load of 20G, which means, quite simply, that about everything else in the airplane will have to fail *before* that engine ever lets go!

The XC-1 has a wingspan of 34', is 23' 6" long and stands 8' 10" high to the top of the propeller. (The entrance to the cabin, however, is a true "step down" design and this height is created by the pylon and propeller.) The ship weighs only 1,300 lbs. empty and 1,950 lbs. fully loaded with 40 gallons of fuel!

Its performance is a real tribute to the skill of its designers for the *Skimmer* has a top speed of 125 mph and cruises at 115 mph! It has an initial rate-of-climb of 700 feet per minute but lands at only 50 mph. It has a range of 700 miles, which is ample to carry it from one seaplane base in the nation to the next one on the route, if the pilot prefers water operation only.

The *Skimmer* is currently undergoing examination and flight tests by engineers of the Civil Aeronautics Administration Region One for certification and these should be completed shortly. Colonial engineers have already received firm orders for 50 of their *Skimmers* at a price of $9,750; they believe that once in production they can offer a 2-3 place high-performance amphibian for considerably less than this figure. If this proves true, they can put their new *Skimmer* with all its added utility for water flying as well as landplane operation in the same price range as equivalent landplanes—and that would be a bargain in any man's language! If clever design and the incorporation of true safety is the cure for the present personal aircraft sales slump, then the Colonial *Skimmer* is the answer to the industry's prayer and the flying public's dream!

The Apex

(*Continued from page 15*)

Propeller. The propeller is carved from medium-hard balsa. A little time and patience spent on its construction will pay off in improved performance. The novice should use an experienced builder's propeller as a model or should carve his propeller under the direction of an experienced person. When carving, use a very sharp penknife. Drill the 1/16" shaft hole before any carving or roughing-out is done. Carve both under sides of the blades first, then both top surfaces. Use the propeller outline template pressed against the undercambered surface of the blade to get the correct outline. Use rough sand paper first, then progressively finer grades to complete the actual forming of the propeller.

Fittings were homemade as indicated on plans. Commercial products may be used, but be sure you allow for the angle which permits the blades to fold flat against the fuselage. The U-shaped wire is bent to the propeller shape and sewed with strong thread or light fish line. If using a commercial product, binding will have to be used where the sewing is indicated. In either case, hinges must work freely with a minimum of play. All fittings and binding are given several coats of thin glue, allowing each coat to dry thoroughly before applying the next. Cover the propeller blades with red Jap tissue. Give each blade six to eight coats of dope sanding lightly between each. Balance the propeller now by giving the lighter blade more coats of dope than the heavier. Rub in red wax shoe polish and use a little elbow grease, with a soft flannel cloth for a high lustre. Bend the 1/16" wire shaft as indicated. Note the wrap-around near the winding loop. This will prevent the shaft from straightening out without warning under full power. (If you don't believe the necessity for this, the author still has a tiny mark at the base of his thumb, received when 3/8" of 1/16" wire, under the pressure of a fully wound 300 sq. in. job of Tony Becker's, hit said thumb at Detroit.) The backplate should be positioned so the propeller will stop at the correct position for good folding against the sides. The tensioner, shown in the plans, has been found best for this type of rubber motor. Adjust it to stop the propeller with the rubber touching only lightly on the bottom of the fuselage, and with a number of winds still left in it.

Power is 24 strands of 3/16" flat *T-56 Brown Contest* rubber, 40" long. Rubber tubing or binding should be used around the motor next to the bobbin, to prevent the motor from knotting around the shaft. Motor run is 1:15 to 1:30, when fully wound.

Dethermalizer. Two wire hooks are glued in the same place on both sides of the rudder base. One or two light rubber bands are passed around the fuselage and hooked on these. A piece of thread with straight pins tied on each end is used to limit the stab travel to 35°. One pin is pushed in the trailing edge of the stab, the other in the end of the fuselage below the stab platform. Fuse is made by soaking 3/16" diameter Venetian Blind cord for a half hour in a solution of ten parts of water to one part of potassium nitrate. A length of 3" (2-3/4" burning length) was found to give a little more than 10 mins. before popping the tail.

Covering and Assembly. Cover the wing, stab, and rudder with red Jap tissue. Use red, lightweight Silkspan, or double-cover the fuselage with red Jap tissue. (Preferably the former.) After water shrinking, cut the paper out of the space between the two center ribs on the stab. The rudder slides in and is glued in this space. Make sure it is properly aligned. Apply four coats of dope (60% dope—40% thinner) to the wing and tail assembly. Give the fuselage six coats.

The last two coats on all parts should be plasticized (about six drops of castor oil to a large bottle of dope). Glue the incidence piece along the main spar, rounding the ends slightly. All bare wood should be given one or two coats of very thin red dope. Align the surfaces by measuring from the end of the fuselage to the corner of the wingtip. Mark and key the wing into place by gluing small pieces of 1/16" x 1/8" on the trailing edge and incidence piece. Key the stab by tying the wing on in the location shown on the plans, then measure from a wingtip to the tip of stab at the leading edge. When measurements are equal, key into place by gluing 1/16" square pieces to fit in the key slots on the stab platform. All surfaces are tied on using light rubber. The flying weight of this ship is the minimum allowable, 8 oz.

Adjusting and Flying. The original *Apex* and its successor flew to the right under power and left in the glide, using 3/32" down- and right-thrust, and left rudder. I do not advise changing this to right-right; this was tried, but the above method was found to give definitely superior performance. Circling should be fairly tight under power and as tight in the glide as possible without spinning in.

When launched under full power, the model will go immediately into a right spiral climb of about 70°. After the first 15 secs. this angle will slowly diminish until the last few seconds when the model will cruise. A beautiful transition between power on and off follows, with the *Apex* describing an S-shape pattern overhead.

Test fly using 100 winds first, and increasing this to 250 when performance is satisfactory. Under 250 turns the *Apex* has consistently turned in times of 2:15 to 2:30. This model was expressly designed to handle terrific bursts of power. It gains one-third to one-half maximum altitude during the first 20 secs. of power, so get every last turn in that motor. Don't forget to light the fuse, and when the *Apex* is launched, head for the nearest motorized vehicle, don't depend on your legs!

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.02 .049
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Design Forum

(*Continued from page 13*)

is considered as the distance between the center of the wing and the center of the stabilizer, because the center of gravity under usual conditions is at the center of the wing. It is more precise and accurate to consider the moment arm and the nose length as being measured from the C.G. So in this model, assuming that the center wing chord is 6", the nose length will be 9" plus 6" or 15".

Now suppose we insert values in the formula: if the wing area A=200 sq. in., the stabilizer will be 66 sq. in. or one third of it as required by contest rules. The average chord will be 5", the propeller diameter 16", the moment arm M should be at least one half the span, with the tail boom as in this model it may be a little more. Supposing we make it 31", assuming the span to be about 42". Now insert these figures in the formula, which gives:

$$N=\left(\frac{66(29)}{0.2(200)}\right)-2(5)-16.$$

Combining, we have: N=45.4−26=19.4" or N equals 19.4".

This represents the *maximum* nose length or distance from the C.G. to the rear face of the propeller, when the stabilizer is one-third of the wing area, regardless of whether the stabilizer is cambered or flat. The fact that it is cambered allows the wing to be forward of the center of gravity for proper longitudinal trim, because the tail gives part of the lift when it is cambered. When the nose length is measured from the C.G., the fact that the stabilizer is cambered may be ignored. Of course, better results will be obtained if the nose length is made even shorter than this. The nose of Mr. Horlon's model is 15" long. This increases stability over and beyond the required minimum.

The formula may be arranged in other ways; for instance, to determine the length of the moment arm, for a given nose length, it is:

$$M=0.2\left[\frac{A(2C+N+D)}{S_A}\right]$$

In the past, model builders have had a tendency to ignore the importance of a short nose and long moment arm and have concentrated upon obtaining a long motor and a larger number of motor turns by lengthening the nose. Actually, the time of climb is not important, it is the altitude *gained* that is important and this may be achieved with powerful short motors and large propellers that give a fast steep climb, with quick recovery and super-stability. Try this combination sometime to verify these facts.

This question of short-nose length in models may be applied in evaluating characteristics of full scale aircraft, which leads us to a subject of vital importance to our country at this time. Several years ago the Army requested submission of plans and specifications for a super-bomber; plans were to be judged on a competitive basis. The bomber design, for which calculations, tests and other data indicated the longest range and best performance in respect to carrying bomb loads long distances, was to be selected for development and construction. A number of excellent designs were submitted, including plans for the present B-36 and plans for a super-bomber of the Burnelli lifting-body type.

The B-36 design was selected and its development was started immediately. Today the B-36 is to our knowledge, the only long range super-bomber in this country. It is the one upon which we must depend to carry the atom bomb to any aggressor who might attack us. Therefore, we may say, the responsibility for winning any war, or in fact our actual existence, rests largely upon the efficiency and the capabilities of this airplane to carry out the missions for which it was designed.

Recently the efficiency of this plane was questioned and an extensive inquiry was held to verify its value and the wisdom of choosing it as the bomber which is to defend America. As far as the public knows, the inquiry upheld the decision to build and use the B-36 as our heavy bomber. This was the decision in spite of the fact that many engineers and prominent fliers in this country have stated that this bomber was *not the best bomber that could have been selected.* At the inquiry, it was stated that "this was the best *heavy* bomber in America." This was absolutely true because no other heavy bombers were actually built . . . but this is not the issue. The issue is . . . *was it the best bomber that could have been built at that time?* Whether or not this is true is debatable. In order to determine some of the engineering facts which may give us a clue to the answer, let us analyze the design of the B-36 from an engineering and design standpoint.

Fig. 2, shows a plan view of the bomber. The first obvious and questionable feature is one which was shown to be a disadvantage in the first part of this article, namely, *the long nose.* Here we have weight disposed at great distances from the center of gravity. This tends to hold the airplane in a steady, fixed position during the flight but, on the other hand, when it is nose upward, downward, or rotated in any manner about the C.G., these remotely located weights tend to increase the rotation, because of their inertia and because they resist any recovery forces produced by the control surfaces. In other words, it is difficult to control this bomber under certain flight conditions. To provide forces of sufficient magnitude for recovery, larger, and heavier control surfaces must be used.

However, this is only a small part of the problem. The B-36 has pusher propellers. There have been arguments ever since the Wright Brothers flew their first airplane concerning whether it was best to have the propeller at the rear, with the wing operating in free smooth air and the propeller in turbulent air, or to have the propellers in front of the wing where they operate in smooth air and the wing operate in turbulent air from the propellers. In each case where pushers have been tried on high-speed aircraft, as for example on the Bell *Airacuda*, they proved to be inefficient and the cause of many structural as well as aerodynamic problems, so that pusher propellers had to be abandoned or replaced with tractor propellers.

Now let us see specifically what takes place with this arrangement. The propellers on the B-36 are of large dimension and turn at such speed that the blade tips travel at sonic speeds; therefore, theoretically, any variation in the airflow over these blades produces intense blade vibration and this is exactly what happens in actual flight. As the air flows over the wing and reaches the trailing edge, the flow becomes irregular and turbulent to some degree. These sonic-speed blades operate in this turbulent air, with resulting vibration and pounding on the blades. This has been verified by many men who have flown the airplane and also by some of the Army engineers.

To make matters worse, the power units are mounted on the wing trailing edge remote from the resultant center of support of the wing truss which must carry these heavy loads. Because they are remotely positioned, intense tortional stress is placed upon the wing. The vibration induced by the irregular airflow over the wing causes extreme harmonic variation in these tortional loads. If the vibration source had been located close to the supporting spars, the amplitudes of the wing tortional vibration might be small. However, with these propellers positioned remotely from the wing spars and on the weaker more flexible trailing edge rather than on the sturdy leading edge, their vibration is transmitted to the wing in the form of extreme tortional oscillations. These in turn carry through to the main fuselage structure and out through the long nose to the cockpit. The farther the vibration travels, the greater the amplitude becomes.

Aside from annoying aspects, this vibration makes it necessary to increase the strength of the structure so it will not fall apart. This can easily be done but only by increasing weight. Consequently, greater weight is added to take care of this faulty design condition. This in turn re-

duces the bomb load that may be carried and/or increases the size of the airplane required to carry a given load still more.

But perhaps you ask, why must the nose be so long? The answer is simple; it is because pusher instead of tractor propellers are used. The considerable weight of the motors and propellers is *behind* the center of gravity (see Fig. 2), so the fuselage must extend *forward* with sufficient weight to counterbalance the weights of motors, propellers, tailplanes, and fuselage to the rear of the C.G. It is obvious, therefore, that when the motors are placed as tractors in front of the wing, their weights are ahead of the C.G. and not behind it. This balances the weights of tail surfaces and rear half of fuselage so a long fuselage nose is not required for balance. The 70' nose, under these conditions could be shortened to at most 35' and probably even to 25'. This in turn would either increase stability and control or make possible smaller and lighter tail surfaces. The result would be a considerable reduction in structural weight due to less fuselage length and less tail structure with a corresponding increase in the useful load—gas or bombs. This is obvious even to a model builder.

Pilots have found it difficult to fly the B-36, especially when taking off. Some have complained that when the plane is nosed up rapidly to increase the angle-of-attack for take-off during the take-off run, they get the impression that the airplane is rising off the ground when actually the wheels are still in contact. As the 70' long nose rises and the tail drops under the action of the elevators, the pilot actually rises 20 or more feet which gives him this sensation. It has been almost impossible to determine whether or not the wheels should be retracted at any given time. Usually in a rapid take-off, a crew member must be assigned to notify the pilot when the wheels are off the ground and the plane is in free flight.

Another feature which might be the father to some slightly uncomfortable moments, if not a result in the destruction of the plane, is the location of gas tanks directly in front of the engines. What, can you imagine, would happen when a shell or some other missile hits one of these tanks or excess vibration causes leaks. Unless leaking gas can flow against the airstream, it must stream rearward over the hot engine. Perhaps the B-36 uses a type of gas that will not explode, but in all such cases on record, fire and explosion usually results. With tractor installations, leaking gas streams rearward *away* from the engines.

Word comes now after hundreds of B-36 bombers have been built with pusher-power units, that these units are to be replaced with tractor installations, probably with turbo-prop engines and propellers. This seems to justify our criticism of the use of pusher propellers.

These are all disadvantages, and if there is no better way to build a bomber, they must be accepted as necessary evils. However, designs for bombers which would have none of these characteristics and which could carry the same or greater loads with less power and more speed were available at the time. For instance, the Burnelli bomber design; this plane has a square box-like fuselage with airfoil section that functions as part of the wing itself. All of its weight is centered along the span and not located at remote positions fore and aft from the center of gravity, as in the case of the B-36 with its exceedingly long fuselage. In other words, the moments of inertia about the spanwise axis are small. Small tail surfaces much lighter than those of the B-36 therefore may be used. Because the fuselage is actually part of the wing, the additional weight of a long fuselage like that of the B-36 is largely eliminated. It is also lighter per cubic foot of volume and sturdier compared to weight because of its box-like structure free from excessive bending stress and deformation. The Burnelli-type body not only weighs less than the cigar-like fuselage but at the same time it *functions as part of the wing* providing at least 40% of the total lift of the airplane so that the additional wing surface required is much smaller and of far less weight than the wings of the B-36. In other words, the wing-fuselage combination of the Burnelli type plane is much lighter because of its design and causes less drag. All of this adds up to an airplane which is *at least* 25% lighter than the B-36 and faster although it will carry more load greater distances with the same or less power, all at much less cost to build.

Many of the top men in the Air Force have proposed in vain that Burnelli type planes be authorized and produced. Gen. H. H. Arnold in a special report to the Assistant Secretary of War on planes of this design says, and we quote, "the coefficient of drag of the Burnelli type modified flying wing is the lowest known for any useful airplane and the coefficient of lift is the highest . . . In my opinion it is essential in the interest of national defense that this procurement be authorized."

Why, is it then that this bomber has not been built for the defense of America? At least, why are steps not taken immediately to produce planes of this more efficient design, when such action has been advised by some of the foremost aeronautical engineers, fliers and military men in the country? These men are being ignored and now as a fitting rebuke for this stupidity, word has been received from reliable sources that the Russians are building planes of the Burnelli lifting fuselage type to carry a medium tank and crew, in large quantities under mass-production methods, planes of a design much more efficient than ours but which originated in America; planes which would be available now for our defense if greater wisdom had been displayed by those entrusted with this responsibility.

All comments and questions are welcome. Send them to MODEL AIRPLANE NEWS, "*Design Forum*," 551 Fifth Avenue, New York 17, N.Y.

2
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NATIONALS!

(*Continued from page 12*)

fliers needing everything from a prop nut to a racing motor.

This about covers the high lights of the various events. Modelers came from all over the country . . . from Mexico, Hawaii, and from Canada to fly. A group from Toronto set up "Little Canada" and their fame soon spread as the overseers of "Hopalong Cavity," a huge Texas grasshopper which was installed in a snappy balsa cage.

Along with "Hopalong," the other Texas livestock was a source of wonder to those from other areas; the jack rabbits appeared to have ears at least a foot long. An armadillo which wandered into the workshop hangar on opening night caused a headlong evacuation. Then there were the huge hoptoads that local modelers dropped into the cabins of visiting modelers' planes, and . . . yes, most of us will long remember the "Red Bugs!"

All in all, most of those present felt that the 19th was a darn good Nationals; registration and processing went off at record speed, the attendance was good, there weren't many lost ships, and despite unfavorable weather, most builders got all their flights in. Our heartfelt thanks to Johnny Clemens and his volunteer helpers, to the Exchangites, and to the Navy, for a successful National meet held under difficult conditions.

We surely hope the Nats can be held in 1951, but at present it is uncertain, to say the least. The Navy favors running the event twice at any one location, to benefit the second year by earlier experience. If world conditions allow, it may be Dallas again for 1951. But who knows—we heard rumors that the Olathe N.A.S. is anxious to play host again!

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Leslie Bartlett, San Diego, California

JUNE PIERCE MEMORIAL AWARD
Jim Wilmes, St. Charles, Missouri

BONEHEAD AWARD
Roy Carter, Jr., Dallas Exchange Club

CLUB CHAMPIONS
Detroit Balsa Bugs

INDOOR STICK

Open—1. Carl Rambo 19:24.1; *2.* Joseph Foster 18:29.0; *3.* Robert Bienenstein 18:22.9. *Sr.—1.* Ronald Plotzke 20:13.4; *2.* Paul Simon 19:15.0. *3.* Erwin Rodemsky 18:53.0. *Jr.—1.* Jim Lempke 10:53.0; *2.* Roger Barron 4:33.0; *3.* Gene Jackman 3:58.0.

INDOOR CABIN

Open—1. Joe Bilgri 16:10.0; *2.* Joseph Foster 16:00.0; *3.* Robert Bienenstein 14:46.2. *Sr.—1.* Charles Hallum 15:21.0; *2.* Carl Redlin 14:12.4; *3.* W. R. Ehrlich 12:10.0. *Jr.—1.* Jim Lempke 8:36.4; *2.* Roger Barron 1:10.0.

INDOOR H-L GLIDER

Open—1. Frank Garcher 0:56; *2.* Joseph Foster 0:53; *3.* Joe Kehr and Carl Rambo (tie) 0:50. *Sr.—1.* D. Rushing 0:50; *2.* Paul Simon 0:47; *3.* W. R. Ehrlich 0:45. *Jr.—1.* Earl Haggard 0:42; *2.* Jim Lempke 0:40; *3.* Curtis Minier 0:39.

FREE FLIGHT GAS CLASS ½A

Open—1. Ted and Mary Samuelson 12:24.8; *2.* William C. deLorme 10:00.0; *3.* George Chapman 9:33.3. *Sr.—1.* John Voedisch 8:47.3; *2.* Erwin Rodemsky 6:24.4; *3.* Robert Parker 6:14.4 *Jr.—1.* Harry Bratton 10:07.9; *2.* Clifford Green 7:00.6. *3.* Leslie Bartlett 6:13.3.

FREE FLIGHT GAS CLASS A

Open—1. Dennis Davis 18:09.0; *2.* Wallace Short 14:17.2; *3.* Frank Lilly 13:14.2. *Sr.—1.* D. F. Huffhines 14:17.0; *2.* Don Murray 13:40.3; *3.* Allen Johnson 13:16.1. *Jr.—1.* Jim Jorski 10:51.8; *2.* Leslie Bartlett 9:09.3; *3.* John Rieker 6:58.5.

FREE FLIGHT GAS CLASS B

Open—1. Joseph Foster 26:11.4; *2.* Ernie Shailor 21:50.3; *3.* Dennis Davis 21:49.1 *Sr.—1.* Norval Hale 18:42.2; *2.* Bill Ballow 16:21.4; *3.* Jim Kohls 15:57.5. *Jr.—1.* Leslie Bartlett 18:21.8; *2.* Gene Jackman 10:16.3 *3.* Jim Jorski 9:41.3.

FREE FLIGHT GAS CLASS C

Open—1. James H. Ripkin 18:45.7; *2.* Donald Butcher 18:41.0; *3.* Ernie Shailor 18:25.0 *Sr.—1.* Jack Emery 23:20.0; *2.* Bert Parker 16:41.0; *3.* Don Raines 15:50.2. *Jr.—1.* Leslie Bartlett 14:06.5; *2.* Paul Bunch 13:33.4; *3.* Gene Jackman 13:13.3.

CONTROLINE SPEED CLASS A

Open—1. Massey-Hall (team) 113.88; *2.* Harold deBolt 112.74; *3.* Thomas Jones 112.46. *Sr.—1.* Eugene Stiles 108.39; *2.* Mark Brown 107.10; *3.* Phillip Laney 105.84. *Jr.—1.* Warren Tomme 116.84; *2.* Bud Ramsey 109.71; *3.* Peter Todd 108.39.

CONTROLINE SPEED CLASS B

Open—1. Tony and Stanley Grish 137.8. *2.* Thomas Jones 124.09; *3.* Manley-Hudson (team) 123.58. *Sr.—1.* Philip Laney 121.5. *2.* Fred Clark 119.95; *3.* (tie) Thomas Rieckeen and Eddie Schwarz 116.84. *Jr.—1.* Leslie Alford 123.24; *2.* Jim Price 121.57; *3.* Warren Tomme 119.16.

CONTROLINE SPEED CLASS C

Open—1. Lew Mahieu 135.28; *2.* Hall-Massey (team) 128.50; *3.* Manley-Hudson (team) 126.71. *Sr.—1.* Jack Friedland 125.5. *2.* Val Jean Feist 124.95; *3.* Raymond Shearer 124.95. *Jr.—1.* Warren Tomme 125.82; *2.* Jimmy Price 115.56; *3.* Larry Weare 110.3.

CONTROLINE SPEED CLASS D

Open—1. J. Warden 142.24; *2.* Thomas Baker 141.60; *3.* Harold deBolt 140.90. *Sr.—1.* Eugene Stiles 147.48; *2.* Mark Brown 143.9. *3.* Raymond Shearer 141.34. *Jr.—1.* Peter Todd 139.48; *2.* Larry Weare 128.89; *3.* Jimmy Price 128.52.

CONTROLINE SPEED-JET

Open—1. Thomas Baker 138.41; *2.* Phil Baker 138.41; *3.* Charles Bothner 132.30. *Sr.—1.* Colin Keys 130.38; *2.* Dale Kirn 130.3. *3.* Jack Gouvermeur 128.52. *Jr.—1.* Ken Mattingly 123.24; *2.* Caesar Fulton 121.57; *3.* Donald Farage 111.07.

CONTROLINE FLYING SCALE

Open—1. George Adams 179; *2.* Richard Moorehead 148; *3.* Stephen Smith 143. *Sr.—1.* Dale Kirn 187; *2.* J. Clevenger 182; *3.* Bryant Thompson 126. *Jr.—1.* Raymond

(*Turn to page 46*)

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1/16x1/8	1c	1/4 sq.	3½c	1/32x2	8c
1/16x3/16	1½c	1/4x1/2	6c	1/20x2	8c
1/16x1/4	2c	1/4x5/8	7c	1/16x2	8c
1/16x3/8	2½c	1/4x3/4	8c	3/32x2	10c
1/16x1/2	3c	5/16 sq.	5c	1/8x2	10c
3/32 sq.	1c	3/8 sq.	6c	5/32x2	12c
3/32x3/16	2c	3/8x1/2	8c	3/16x2	14c
3/32x1/4	2½c	1/2 sq.	9c	1/4x2	16c
3/32x3/8	3c	3/4 sq.	15c	5/16x2	18c
3/32x1/2	3½c	PLANKS		3/8x2	20c
1/8 sq. 3 for	5c	1x3	$ .55	1/2x2	22c
1/8x1/4	2½c	1x6	1.10	1/32x3	13c
1/8x3/8	3c	2x2	.80	1/16x3	13c
1/8x1/2	4c	2x4	1.25	3/32x3	16c
5/32 sq.	1½c	2x6	1.80	1/8x3	16c
3/16 sq.	2c	3x3	1.50	3/16x3	22c
3/16x1/4	3c	3x6	3.00	1/4x3	25c
3/16x3/8	3½c	4x4	3.80	3/8x3	31c
3/16x1/2	5c	4x6	4.25	1/2x3	34c

Beveled balsa trailing edges, 36" lengths

3/32x3/8	3c	5/32x5/8	5c	7/32x3/8	7c
1/8x1/2	4c	3/16x3/4	6c	1/4x1	8c

Propeller Blocks

8x7/8x1-3/16	6c	1-3/4	24c
10x1x1-1/2	10c	9x1-1/2x2	15c
12x1x1-1/2	12c	10x1¾x2	20c
14x1-3/16x1-3/4	18c	10x1-1/2x2	26c
16x1-3/4x2	32c	3x3/16x20	18c

Glider Wing Section

Comet tube cement ..... 10c & 25c
Tester A or B cement ..... 10c & 25c
Clear Dope ..... 1 oz. 10c, 2 oz. 20c, 8 oz. 50c
Thinner ..... 1 oz. 10c, 2 oz. 20c, 8 oz. 50c
Colored Dope ..... 1 oz. 10c, 2 oz. 20c, 8 oz. 45c
Red, Orange, Yellow, Green, Lt. Blue, Metallic Red, Metallic Blue, Black, White, Silver, Olive Drab
Music wire ..... 3 ft. .020 & .030, 3c; .035 & .040, 4c; 1/16, 5c; 3/32, 10c; 1/8, 15c
Silkspan, White ..... 00, 5c sheet; GM, 10c; 3 for 25c
Jap Tissue, Red, Yellow, Blue ..... 2 for 15c
G-M Tissue, White, Red, Yellow, Blue ..... 10c, 3 for 25c
T-56 rubber, per ft. 1/32, 1/16, 3/32, 1/8, 1c; 3/16, 1½c; 1/4, 2c
Aluminum tubing, per ft. 1/16, 3/32, 10c; 1/8, 12c; 3/16, 15c; 1/4, 18c
Brass tubing, per ft. 1/16, 12c; 3/32, 14c; 1/8, 18c; 3/16, 20c; 1/4, 24c
Plywood sheets 6x12; 1/16; 3/32; 1/8; 3/16; 1/4 30c
Cellulose acetate sheets .005, 10c; .010, 20c; .020, 30c
Tester carved balsa propellers 12", 14" & 16" dia. ..... 50c ea.
Jasco rubber lube ..... 1 oz. 15c
Jasco Micrafilm Solution ..... 1 oz. 17c
Prop hook ..... small 5c; med. 5c; large 5c
Large face bushings ..... 3/8"; 7/8", eyelet 1/16x3/16, 5c
Propeller hinges ..... 20c set
Tensioner springs 5c
Ball bearing washer .040" I.D.; 3/16" I.D. 10c
Prop washers 1/4" OD; 3/8" OD ..... 12 for 25c

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NATIONALS!

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TOWLINE GLIDER

Open—1. Harold Gauger 11:40.0; 2. Raymond Good 8:12.8; 3. J. J. Beasley 7:09.1. *Sr.—1.* Murray Feigenbaum 11:50.6; 2. James Casper 10:37.3; 3. Harry English 9:52.4. *Jr.—1.* Leslie Bartlett 5:53.0; 2. Earl Haggard 4:32.0; 3. Curtis Minier 3:03.8.

CO2

Open—1. Joseph Elgin 18:02.7; 2. Frank Garcher 10:16.4; 3. Frank Ehling 8:47.8. *Sr.—1.* Richard Culp 7:07.4; 2. Billy Jaggers 4:04.8; 3. Edward Mate 4:04.8. *Jr.—1.* Judson Stone 4:10.0; 2. Leslie Bartlett 2:18.7.

STUNTS

Open—1. L. J. Andrews 418; 2. Bob Palmer 391.5; 3. Harold deBolt 362. *Sr.—1.* Donald Ferguson 390; 2. Don Still 371; 3. Charles Mullins 347. *Jr.—1. Mickey Muening* 350.5; 2. Caesar Fulton 321; 3. Melvin Wartenbe 315.6.

RADIO CONTROL

1. Gene Foxworthy 120.5; 2. James Schenck 113; 3. George Trammel 110; 4. E. Paul Johnson 82; 5. Jim Walker 77.

R. O. W.

Open—1. Keith Kreigh 10:59.2; 2. Hubbard-Collins (team) 9:43.2; 3. Joseph Foster 5:57.0. Sr.—1. Paul Simon 5:46; 2. Bill Fox 5:11; 3. Norval Hale 2:31. *Jr.—1.* Jerry Boughnour 1:30.

OUTDOOR H-L GLIDER

Open—1. Robert Bienenstein 5:13.3; 2. Dick Everett 4:17.8; 3. G. W. Patrick 3:23.4. *Sr.—1.* D. Rushing 3:21.7; 2. Gerald Turner 3:21.0; 3. Carl Hallum 2:59.4. *Jr.—1.* Don Tune 9:31.1; 2. Jim Lempke 2:34.3; 3. Bob Gelvin 2:05.5.

PAA-LOAD CLASS ½A

1. Frank Ehling 13:16.4; 2. Dan Dougherty 4:27.4; 3. Jack Greenspan 4:06.9.

PAA-LOAD CLASS A

Open—1. Raymond Mathews 10:24.1; 2. Joe Bilgri 9:29.1; 3. Richard Sladek 8:35.8. *Jr.-Sr.—1.* Jim Neal 12:46; 2. Paul Simon 7:20; 3. Lester Smith 6:06.

PAA-LOAD CLASS B

Open—1. Joseph Foster 10:20.8; 2. James Ripkin 9:32.2; 3. Joe Bilgri 6:13.7. *Jr.-Sr.—1.* Gordon Hilton 12:24.7; 2. Herbert Watson 8:09.2; 3. Bob Dever 6:36.7.

FREE FLIGHT RUBBER STICK

Open—1. Dick Everett 17:26.1; 2. Robert Dunham 16:01.1; 3. Carl Lindsey 14:53.2. *Sr.—1.* Charles Hallum 17:50.0; 2. Carl Redlin 17:13.4; 3. W. R. Ehrlich 9:29.0. *Jr.—1.* Jim Lempke 6:08.0; 2. Don Tune 5:00.7; 3. Melvin Wartenbe 4:20.4.

FREE FLIGHT RUBBER CABIN

Open—1. Dick Everett 15:23.3; 2. Joseph Foster 15:07.0; 3. Thomas Quermann 14:26.1. *Sr.—1.* Charles Hallum 14:25.6; 2. Carl Wheeley 9:32.6; 3. A. E. Walloch 8:48.8. *Jr.—1.* Leslie Bartlett 9:40.7; 2. Jim Lempke 5:47.6; 3. Don Tune 3:22.3.

FREE FLIGHT RUBBER SCALE

Open—1. Paul Gilliam 243.8; 2. Edward Stall 239.1; 3. Thomas Quermann 238.5. *Sr.—1.* James Casper 204.5.

TEAM RACING

1. Donald Post; 2. Rudy Panko; 3. Manley and Hudson (team).

NAVY CARRIER

1. Cal Smith 370.46; 2. Don McKercher 200; 3. Harry Harper 157.84.

NAVY RADIO CONTROL

1. Jim Schenck; 2. Vernon Tauberg; 3. Colby Evatt.

Air Ways

(*Continued from page 27*)

We learn from several sources that strong efforts are being made to have other international model plane events staged concurrently with the Wakefield in the future. These events will undoubtedly include engine-powered planes and gliders. Full details will probably be available soon. For those who have not yet heard, the American Wakefield Team included: Edward Naudzius, of Highland Park, Michigan; Lo Salisbury, of Huntington Park, California; Fudo Takagi, of San Diego, California; John Erving, of Staten Island, New York; Edward Lidgard, of South Bend, Indiana; and Austin W. Leftwich, of Richmond, Virginia.

TEAM RACING, now well established in this country, has apparently taken England by storm. A recent letter from Mr. N. Higgins, from that country, includes a few items that may interest team racing enthusiasts over here. For one thing, he notes that diesel-powered planes regularly put it over glow-plug ships, since the diesels only have to make two or three stops in 10 miles, even though the glow engines are tops as far as speed. The English boys have also found the diesels easier to start, and can get away first unless the glow-plug engine users employ electric starters. However, those owning such starters are considered in the same class with "bloated capitalists," and there may even be a ban on such starters in the future!

* * *

Our first photograph this month was sent from far-off Indonesia by Sgt. F. Lamster, Djl. Malabar Nr. S., Bandung, Indonesia, who writes that both the Dutch and Indonesian youth are very much interested in model aviation. Ironically enough in that country which is noted for its production of raw rubber, it is impossible to obtain any processed rubber to be used for model airplane power purposes. The Sgt. notes that he has never built a rubber-powered model plane that would fly more than 150' and also that with a 20" length of rubber, it is only possible to put in just 180 turns. For this reason, he has had to specialize in gliders, and the picture shows a 7' job with which he has had considerable success. Unfortunately, he gives us no details about this glider aside from the fact that his son is in the picture with it.

Direct from the country where the Wakefield originated comes picture No. 2 which presents a joint design and construction effort by Mr. G. Woods and Mr. M. Garnett. Mr. Woods (34 Beverley Road, Herfield, Bristol 7, England) claims several novel

COMING CONTESTS

Sept. 10, CONN.—New Haven, Class AAA, 1950 Greater New Haven Model Meet, U, Beauty; CD's—William Paulson and Thomas Cimino, 919 N. High St., East Haven.

Sept. 10, N. Y.—Hicksville, Long Island, Class AAA, Invitational Championships for all F, R, G; CD—Alfred Armellini, 212 Raff Avenue, Mineola, Long Island.

Sept. 10, CALIF.—Culver City, Class AAA, *Sky Kings Model Airplane Club's* 2nd Annual Meet, U, St, Sp, S, TR, J; CD—Donald Anderson, 1225 W. 31st St., Los Angeles.

Sept. 10, OHIO—Akron, Class AA, *Akron Society of Model Plane Engineers* Meet, Wakefield type inter-City team competition; CD—Frances Alexander, 25 Mull Ave.

Sept. 17, OHIO—Shelby, Class AAA, Shelby *Balsa Buzzard's* 5th Annual Meet, F, CO2, R; CD—same as Aug. 20.

Sept. 17, PA.—Pittsburgh, Class AA, *Pittsburgh Model Airplane Control-Liners'* U Meet for TR. CD—same as Aug. 27.

Oct. 8, PA.—Pittsburgh, Class A, *Pittsburgh Control-Liners'* U Meet for Sp, St, S; CD—same as Aug. 27.

Oct. 15, PA.—Pittsburgh, Class A, *Pittsburgh Control-Liners'* U Meet for TR, restricted to members of club; CD—same as Aug. 27.

U—Controline; F—Free Flight Gas; R—Free Flight Rubber; G—Glider; RC—Radio Control; W—Water Events (ROW); S—Scale; I—Indoor; T—Towline; PAA—PAA-Load; Sp—Speed; St—Stunt; TR—Team Racing; J—Jet Speed; HL—Hand Launched; Class—shows size of meet and signifies AMA sanction; AMA—Academy sanctioned.

features for this ship, including rubber vibration dampening device which he states is highly effective. This device may be seen directly under the wing. The folding prop features an entirely new hingeing method to eliminate the usual skew hinge. The propeller blades are of laminated construction. An airfoil section of the Isaccson series having a high lift is shown for this model and it has been found to glide like a dream. Simple flip up tail kind of dethermalizer is very effective. Mr. Woods notes that this type of dethermalizer is rapidly substituted for the chute which has been highly popular in England. Maximum area for his model shown is 207 sq. in. and the weight is a trifle under 8 oz., including a 3-1/4 oz. of rubber.

The two solid scale models which appear in our third illustration are the work of Pfc. Dwight Brooks, who is located at the U. S. Marine Corps Air Station in Santa Ana, California. The model on the left is a F-86 Sabre which was completely built up from hard balsa and was finished with ten coats of sanding sealer and six coats of silver. The cockpit includes radio phones, seat, instruments, parachute, etc. Wingspan is 15" and the wheels are completely retractable. At the right is a Panther Navy jet plane. It also has a highly-detailed cockpit with sliding canopy. This ship is finished with only five coats of sanding sealer on top of which were applied eight coats of blue dope. A coat of hot fuelproofer was added over the blue to produce a high gloss. Neither of these ships were built from kits, and Pfc. Brooks states that he has been building ships for sixteen years. He is interested in models of all sorts, including planes, boats, and cars.

A New Zealand free flight kit model, called *Skyrocket*, appears in picture No. 4. This ship was built by Byron Burr (2A Dickson Street, Giaborne, North Galord) who claims that it really lives up to its name. He gives us no other details of this ship but does mention that he is a member of the *Grisborne Model Aero Club*.

C. I. Mitchell, Jr. (C. I. Mitchell & Sons, Sporting Goods, Temple, Texas) is responsible for the design and construction of the big stunt plane in photograph No. 5. The model has a wing area of 550 in., weighs 41 oz., and is powered by a *Glo-Devil* engine. Mr. Mitchell notes that the ship is an extremely good stunt job and that the photos were taken by M/Sgt. A. B. Sulek, of Ft. Hood. It might be noted that a very special pilot's seat has been fitted.

Our last picture shows a very ambitious project, a 7' B-17 scale model, which was built by Harry Haskell (4246 Sunnyside Avenue, Venice, California). He has flown it quite a few times. The gross weight is 13 lbs., and the four *O & R 23* engines give it a speed of 40 mph. The ship is planked with 1/16" balsa sheet, and the cowlings are coated with Weldwood and shaped over wooden forms. The realistic plexiglas nose was shaped with a wooden form, using heat from an oven. Mr. Haskell states that he has been building models in his spare time for about six years.

* * *

News of Modelers

PEN-PAL SEEKERS: Barry Blackman, Two Kooloora Avenue, Harbord, Sydney, Australia, wants to contact someone interested in Wakefield designs . . . 2447485 AC Dyer, Charles W., Section D.F.L.S., Central Fighter Establishment, RAF West Raynham, Fakenham, Norfolk, England, would enjoy writing to an American club . . . I. McDonald, 27 Pickhurst Rise, West Wickham, Kent, England, age 15, is eager to correspond with an American model builder who likes glider flying.

SPECIAL REQUESTS: Joseph J. Soubrada, 40 New Street, East Islip, Long Island, New York, has several years of model airplane magazines that he would like to exchange for English model airplane publications . . . Edwin C. Woynoski, P.O. Box 72, Nanticoke, Pennsylvania, is breaking up his reference library of foreign magazines, such as AEROMODELLER, and MODELLFLUG.

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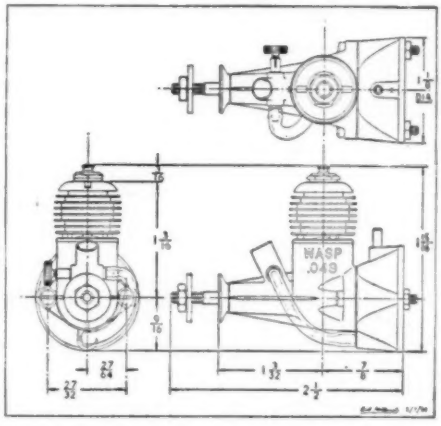

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We will do all we can to see that one is ready for you.

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Club News

Florida

We finally have been sent the list of winners who won at the 1950 Dixie Regional Model Air Show which was held at Corry Field, Pensacola, on June 3 and 4. We are glad, too, that we received it in time to include in this issue. *Class A Speed Open*—Henry A. Thomas 116.84; *Sr.*—Eddie Joe Schwartz 97.79; *Jr.*—Warren Tomme 111.07; *Class B Speed Open*—William C. Yarbrough 124.95; *Sr.*—Eddie Joe Schwartz 120.76; *Jr.*—Warren Tomme 124.09; *Class C Speed Open*—Dr. J. R. Warden 127.61; *Sr.*—Eddie Joe Schwartz 126.71; *Jr.*—Warren Tomme 124.95; *Class D Speed Open*— Fay Caton 138.41; *Jr.*—Warren Tomme 134.27; *Jet Speed*— A. C. Farage 125.82; *Stunt Open*—S/Sgt. Clark H. Crowe, Jr., 393.3; *Sr.*—Richard Buchanan 354.3; *Jr.*—Pat Acosta 349.6; *Flying Scale*—Leon P. Maerscheidt, Jr., 168.0; *High Point Contestant*—Warren Tomme; *Oldest Successful Contestant*—Chet Farage; and *Youngest Successful Contestant* — Pat Acosta.

Massachusetts

The *Boston Balsa Bees*, an active controline club in Greater Boston, are seeking new members. Anyone interested should contact William O. Ellis, 135 Federal Avenue, Quincy, Massachusetts.

New York

The winners and their classes of the 4th Annual Plymouth Model Plane Show are as follows. The show was held at Williamsville July 14 and 15. STUNTS *Class A-B Open*—Harold R. Nesbitt 254 pts.; *Sr.*—Maynard Crosby 51; *Jr.*—James Miller 247; *Class C-D Open*—George Willson 379; *Sr.*—Maynard Crosby 277; *Jr.*—Robert James 328; SPEED *Class A Open*—Henry Nixon 109.7 mph; *Sr.*—Al Stegens 97.8; *Jr.*—Edward Shults 98.7; *Class B Open*—Harold DeBolt 125; *Sr.*—Al Stegens 120; *Jr.*—Edward Shults; *Class C Open*—Kenneth Holden 115.3; *Sr.*—Edward

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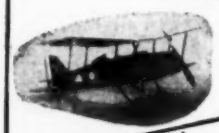

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Smith 129.5; *Jr.*—Walter Carlson 106.5; *Class D Open*—Harold DeBolt 140.57; *Sr.*—Al Stegens 135.3; *Jr.*—Clayton Burlinghoff 128.5.

North Dakota

More than 2,000 spectators watched the contestants fly their ships at the 2nd Annual Model Airplane Contest staged at Hector Airport, Fargo, on June 25. Four contestants who arrived late in the afternoon were unable to compete because a severe rain and windstorm brought the contest to an end at 4:30 p.m. Capt. Karl Ording, of CAP Squadron One, directed the entire affair. Here are the winners: *Flying Scale*—Paul Blegen; *Sr. Stunt Event*—Andy Brasted; *Jr. Stunt Event*—Ed Schneeman; *Class B Speed*—Andy Brasted; and *Class C Speed*—Fred Roberts.

Ohio

Following are the names of the lucky winners who entered the *Rubber City Aeronauts'* Hobo Style Contest which was held June 25 at Chamberlain Field: *Hand-Launched Glider Sr.*—John Ward; *Beginner*—D. Baughman; *Rubber-Stick Open*—D. Obarski; *Sr.*—Marvin Allen; *Jr.*—P. Ward; *½A Free Flight Sr.*—J. Ward; *Jr.*—R. Baker; *Stunt*—G. Boatman; *Class B Free Flight Sr.*—B. McMillen; *Jr.*—Caylon Leohr; *Class C Speed Open*—S. Ambler; and *Jr.*—G. Weber.

Little Dragon

(*Continued from page* 23)

the eye appeal; rough tool marks give the engine the appearance of having been whittled out of a stove bolt with a cold chisel!

The block is drilled out to an I.D. of a shy 9/16" and brought up to size with a boring tool, or reamer. Getting the correct depth is important, not because it will prevent the engine from running, but because you will have to go over the whole thing changing other dimensions to make it come out right. Note how a shoulder is left to support the liner. This liner must fit closely in order to prevent blow-by around the exhaust port and at the head. This does not mean a piston-type fit by any means, but it should be tight enough so that it is just about possible to pull the piece out with the fingers. A dummy sleeve cut from the steel tube stock is a great help here. If by some mischance the hole is oversize, don't scrap the job, just tin the sleeve and resize it to fit the hole. (But you won't be able to harden the sleeve if you do this, and then you will have to use an aluminum or cast iron piston.)

Remove the piece and rechuck it in order to bore out the front of the case. Open this up part way with a drill and bring to final size with a boring tool. The inside rear must be faced off smoothly because the rotor valve will ride against it. The rotor pin hole is drilled out by holding a 3/32" drill in the tailstock. At this point lay the piece aside and make up the crankcase front section. Do a good job here and no gasket will be needed; in any case a short piece of thread wrapped around the plug portion of this part will serve very well as a gasket. If the inside end is turned first and fitted to the block, the job is easier, as this leaves something to chuck with. Next, reverse the piece and bore out to 3/16" I.D. and bring the outside down to size. No bearing is used other than the metal itself. If you want to be ritzy about it, the hole can be bored oversize and bronze or *Oilite* bearing material pressed in. In practice, the writer has found aluminum to serve very well, but the coefficient of friction of *Oilite* material is undoubtedly more favorable if the end in view is extreme performance. For that matter, ball bearings small enough to be used in this engine can be obtained, and we are indebted to Malcolm D. Whitman, Jr., of Carmel, Calif., for that information. If you use ball bearings, the crankshaft diameter must be reduced or the outboard end of the bearing increased to accommodate the ball race, should double ball suspension be desired.

The crankshaft belongs to a breed of cats that seems able to scare a lot of people. Don't worry about it. Put the three-jaw chuck on your lathe and insert the piece of 9/16" drill rod. Bring this down to size with light cuts and power feed. Finish the journal with a fine file, crocus cloth and common sense. If you happen to have a tool post grinder, by all means use it. Custom fit the shaft to the crankcase front section, double checking to be certain the thrust washer clearance is adequate, then mark the spot and turn down to the size you have selected for the threaded portion. We call for an 8-32 thread, but this is a matter of choice and whatever die you have handy. The threads may be cut on the lathe, but some will find it less trouble to back off the tail stock and use an ordinary die. Be sure to start it straight; back the die off every half turn to break the chips and insure a good thread. A few drops of light oil makes the cut easier. Near the end of the cut it is a good idea to reverse the die in order to cut the threads up close to the journal. The thrust washer is simply a threaded disc. The writer has used threaded drive washers on a number of engines with good results and why no commercial engine uses them is something of a mystery since it is certainly easier than milling splines or grinding flats.

Now, remove the piece and put on the four-jaw. Chuck up the shaft by the journal and off-center the piece 3/16" by adjusting the jaws. It is possible to hold the piece adequately without marring the journal, but the cautious may wish to push the shaft into a length of brass tubing and squeeze the jaws down on this. If this is done, be sure to use only a gentle tapping to put it in place, because the journal must be knocked out again afterward. The whole secret of turning off-centers is setting the lathe tool on center, feeding in slowly, and using power feed to drag the tool along the work. In addition, be willing to take a little time to do the job. The pin should be brought to a good surface finish. The crank disc may be ground or filed away as indicated by the dotted lines on the plan for a sort of counterbalance effect, but this is not critical.

The rotor comes next. Most people seem to have the opinion that disc valves must be tricky since they come in the more expensive engines, so we'll give a little background on this. When the original *Little Dragon* was being laid out, a great deal of consideration was given to the induction method. It had to be very simple and very effective. Three-port induction seemed simple, but it meant tapping into the block and cutting another hole in the liner. Besides this it did not allow much leeway for error and would not produce the best power output. Shaft rotary looked good at first glance, but this would mean less than optimum strength for the crankshaft, chances for errors in both the port hole and the hollow shaft, and the added difficulty of setting the intake tube into the front case. So that was out. Next we toyed with the idea of flutter valve induction; these arrangements are simple, and since they work

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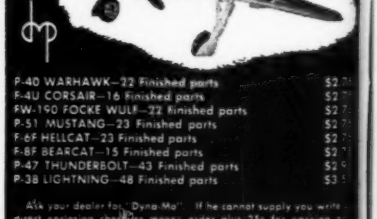

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on crankcase pressure, very effective. However, a speck of dirt, or oil hardening in the valve makes them inoperable with a vengeance. Further difficulty was foreseen due to the great powers of fuel meniscus in these small sizes. *Fuel meniscus*? That did it! So we used a disc rotor and made it free-floating. Five minutes after assembly we knew we had it. Only two smooth faces are needed, and one of them is already inside the crankcase. Best of all the intake hole can be spotted easily, and if missed, it can be tried again with a new rotor. In addition to all these advantages, the thickness of the rotor is not critical and this gives the amateur machinist another place to pick up and correct accumulated error.

Chuck up the 5/8" aluminum rod and turn down the rotor shaft to fit the hole in the rear of the engine block. This should not be a tight fit, but smooth running and a bit loose if anything. Bring the O.D. of the rotor down to size and face it with a gentle cut, making certain there is no shoulder next to the shaft as this will prevent seating. Cutting loose from the stock should be halted about halfway through and all sharp edges broken, then complete the severance. Locate and drill the drive hole. This should be a bit oversize, but *do* not drill all the way through the disc, just enough for good clearance. Mark the outline of the port and file away the indicated area. The rotor may be held between two thin bits of wood or fibre in a vise for this operation. Break any edges that develop. Now, take up the block and put the rotor shaft into the hole from the outside rear of the case and scratch the outline of the round portion as shown on the plan. Split the difference between this line and the edge of the shaft hole and drill a 1/8" hole along the diagonal. The intake tube is a length of 5/32" thin wall brass tube. Taper one end slightly (this taper is emphasized on the drawings) and press the tube firmly into the case. The needle valve assembly may be from a *Baby Spitfire* or other small engine.

The crankcase front section must now be drilled; set it in the engine block and spot the holes for drilling. These holes are drilled and tapped 2-56. The original engine used 3-48 screws throughout, but the larger size is not needed. However, it may be comforting to know that if you ruin the No. 2 hole you can always retap it for 3-48. Tapping is easier if the holes are first filled with kerosene and the tap backed off at frequent intervals. Tap in the mounting studs next.

At this point, clean up all the parts and make a trial assembly to be sure everything fits smoothly and turns freely. If the rotor valve shows a tendency to creep forward on the pin, don't worry about it—it won't when the engine is running. The important thing is that it seats well and does not bind at any point.

(Next month we'll bring you the concluding part of the *Little Dragon* construction article, giving instructions for con rod, cylinder head, and the amazingly simple sleeve and piston arrangement which eliminates the need of conventional milled or cast-in by-pass. Details of fuel, starting and running will also be covered.)

BILL OF MATERIALS (for entire engine)

8" of 3/4" sq. hard aluminum alloy rod
2" of 5/8" round hard aluminum alloy rod
3" of 1/2" round 17ST rod
3" of 9/16" seamless steel tubing
3" of 9/16" drill rod
1" of 1/8" O.D. heavy wall brass tube
1" of 5/32" O.D. thin wall brass tube
Scrap of 1/8" thick dural sheet (hard) for con rod
2—3-48 studs 5/8" long
8—2-56 or 3-48 screws, fil. head, 3/8" long
2—No. 4 hole washers
2—3-48 nuts
1"-sq. thin gasket material
1 *Baby Spitfire* needle valve assembly
1 *McCoy Hot Point* Plug

Starflight

(*Continued from page 25*)

make outline drawings on a piece of wrapping paper, marking the rib locations. After assembly, sand well and cover. Take care to remove all warps when doping. The rudder is fitted between the two center ribs on the stabilizer and cemented in place.

Finishing. The original model was covered with yellow *Silkspan*, and given three coats of thin, plasticized dope. We suggest that use of colored dope be minimized, to save weight. On the original ship, we used blue *Trim-Film* for all striping and black *Trim-Film* for control outlines and cabin door outlines. It's easy to apply and makes a clean job. One coat of hot fuelproofer on the fuselage and center section of the wing completes the job.

The drawings show no fuel tank because every model builder has his own pet theories along this line, and the model's construction is such that almost any type may be used. You may, if you are using the *Baby Spitfire*, fuel from the tank which is supplied with the engine, in conjunction with Mel Anderson's *Baby Timer* (a marvelous little gadget, by the way) or, you may choose a simple coiled-tube type of tank, held on the side of the fuselage with rubber bands. Whichever type you use however, never fly the model with an engine run greater than 20 secs.

Adjustment and Flying. The original model proved very easy to adjust, and if you have been fairly careful with the construction, your version should give no trouble. Before hand-gliding, check the wing and stabilizer for warps. If any are present, remove them by steaming or moistening the covering with dope thinner and pinning the surface flat on a board. The model should balance on or very near the wing spar when supported on your finger tips, and any major unbalance should be corrected by addition of modeling clay to the nose or tail as required. Check lateral balance also, by suspending the model by the fingertip method from the prop shaft and rear stabilizer dowel. Again correct any unbalance by the addition of clay to the high wingtip. Now we are ready for the glide tests. Hand glide in tall grass, if you can find any. Adjust the rudder tab for a glide circle of approximately 150' diameter and work on the glide until it is smooth and flat. If the model has any stalling tendencies, remove them by shimming up the leading edge of the stabilizer. Diving tendencies should be corrected by shimming up the stabilizer trailing edge.

The first power flights should be attempted with caution. We added two 1/32" thick brass washers behind the right side of the engine to give left-thrust. Set the timer for approximately 10-sec. engine run and launch gently into the wind, noting any unusual turning tendencies or stalling characteristics. If the model climbs steadily with a smooth left power turn and no hint of a stall, your adjustments are correct. Any unusual tendencies must be corrected by adjusting the thrust line for smooth-power flight. When satisfied with the initial 10-sec. power flights, set the timer to 20 secs. and enjoy yourself.

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Design of Radio Control Planes

(Continued from page 19)

own, make yourself a *Rudder Bug* or some other proven design of about 5 to 6 sq. ft. of wing area. But, if you *can* design your own, you can suit your ship more to your specific needs. For instance, after the writer had gone through the inconvenience of transporting the plane shown in Fig. 2 over 20 miles to an airport in order to fly, suffered several disastrous crashes (ask Walt Schroder who did the building and patching!), he evolved the little 56" span job in Fig. 1. This ship could be flown out of a small pasture, surrounded by trees and flanked by 1,000' high wooded hills, and has tumbled out of telephone wires and trees, spun-in, and now has been given to some R.C. tyros for their first attempt at radio flying.

Size therefore is a matter of terrain, whether or not the plane will be flown in contests, and certain other practical aspects, including visibility. If you consider the weight of radio and batteries of the MacNabb radio, which at the moment is closest to "free" operation, a 5' plane, if compactly and lightly built, will weigh 3-3/4 to 4 lbs. The same holds true for the Good Brothers equipment, whose manufacturer demonstrated 27 mc. equipment at the '49 Nationals. The 56" x 9" wing of the *Citizen* ultimately gave a wing loading of 18 oz. per sq. ft. With the exception of a tendency to lose height on turns—embarrassing on the approach where excess speed could build up in a 180° turn, the loading mentioned, *for that size model*, gave completely satisfactory results. In other words, lighter radios and batteries, such as those put out by Control Research and Berkeley, would give good sport performance and some contest ability—fine for flying in a calm—in a 4-1/2' machine. With these radios good, cheap, long-lasting jobs could be made all the way down to 4', or even 3-1/2' span, for use with .045's, .049's, and the *Cub .074*. Our *Citizen* was powered by an *Arden .09* with glow plug and, despite a present power loading of 666 oz., left nothing to be desired —except windy-weather performance.

It would seem that a 5' wing is the minimum for a nice compromise on good turns with spiral-diving ability; 5' is also the minimum size that can be flown suitably at a distance (one-half mile) with normal eye sight. It will be found that accurate control is less easy at short distances close to the ground, than when the plane is further out but at a higher altitude. The plane in Fig. 1 proved awkward low down at one-quarter mile although it often was flown easily beyond one-half mile but at high altitude. Looking up, rather than out, makes an important difference. Ships like Foxworthy's and McElwee's have proved that a five-footer can do anything a six-footer can do.

Size, too, is affected by desired loadings and by scale affect. With almost identical loadings, the three ships illustrated have entirely different types of performance. By coincidence the wing loading becomes higher with the larger size ships (in this case). But the bigger ships, for all their weight, fly more gracefully and in proportion to their size. Ed Rockwood got us thinking on this oddity in the profiles shown. At 21 oz. wing loading, the biggest ship refuses to spiral with normal rudder, and makes graceful nose-high turns, perfectly banked. The Fig. 3 ship turns reasonably well but will spiral. The Fig. 1 ship, the littlest, is spiral-prone. Evidently, wing loading is more of a slide rule than a yardstick. As the wildest kind of an estimate based on the experience of this trio of planes, a 12 oz. loading on 3-1/2 sq. ft. would have given the same performance as 20 oz. on 6 sq. ft. Unfortunately, all the writer's experience has been with high loadings so a more pertinent example cannot be given. However, a 16-oz. wing loading for 5 to 6 sq. ft. is said to give top performance without floating.

Loadings automatically determine airplane size. For example, if you figure on a 16-oz. radio weight, and a gross weight of about 72 oz. for the average, roughly 6' span machine, then couple this with the wing loading you desire—such as 12 or 16 oz.—simple arithmetic does the rest. At 16 oz. you get 4.5 sq. ft., or a 60" wing at 6-1 aspect ratio, allowing for tip area loss. At 12 oz. you have 6 sq. ft. or a 72" x 12" wing. There is a great difference in flying characteristics between the two! The plane in Fig. 3 has the rather high gross of 96 oz. due to three extra coats of paint, a special heavy (but reliable!) escapement with intermediate batteries, and a combined radio-battery weight of about 18 oz. Wanting 17, we got 18 or 19 oz. and find nothing wrong with the results. Its wing is 66" x 11".

Higher loadings on larger sized models are easily handled. The glide may be slowed up with negative in the tail and the increasing spread that results between glide and power-on speeds may be compensated for by added downthrust. McElwee's job at the Mirror Meet had a high-flying speed, yet glided slowly with nose high. However, it also had 6° of downthrust. Incidentally, it had the comparatively thin Clark Y wing. The writer has found that this adjustment prevents added gross from building up the glide speed and greatly increases the accuracy of approach, and ease in making a good spot landing. Best glide speed is always higher than desirable and all models are slowed down, so why not R.C. ships? Best glide covers the most ground but at comparatively hard-to-judge shallow angles; slower glide results in a steep angle of approach and slow descent, but with nose high. This latter is easy on nosewheels!

Only two years ago the writer designed what he thought a daringly high power-loaded model. Loading was 225 oz. But radio control work makes you realize that flying on the wing instead of the propeller has unrealized possibilities. The issue is confused by the fact that, slowly retreating from the .60 powered goliaths, we have settled on .29's, which then are throttled back. A good .19 will do as much, if not more, than a throttled back .29. This means that glow plug may be used with comparatively small engines running wide open. The exact performance desired may then be realized by the selection of fuel brands, (hotter when needed) or by more- or less-efficient props.

The ideal combination of the *Arden .09*, *Powermist* fuel, and the *Tornado* 10-4 sport prop with generous blade area, permitted the Fig. 1 plane to climb satisfactorily at 666 oz. power loading. Many *Jasco* gliders are flying R.C., powered by *Cubs* in over-wing nacelles and we have heard of 6' ships of this type winding in with the "gentle" urging of an .049! Sport models should have high-power loadings. The ship in Fig. 3 has more than 480 oz. loading but steps right along on its *Arden .199* with spark ignition. It is interesting to find that, when thrust is marginal, due to engine, prop, or setting, any radio control model will fly at good speed without attaining excessive altitude. It's the climb that suffers more than the forward speed! A 72-oz. ship with a .29 has approximately 250-oz. loading, but if flown throttled back, its actual power-loading will be much higher. For a sport model of 5 to 6' span, there is nothing better than a good .199.

"Non-believers" still suspect R.C. models of old-fogiesm, due to their relatively slow flight and gentle maneuvers. The main limitation of flying speed is the inability to control the ship by means of a rudder on present escapements. But the widely popular escapements avoid more complex methods, are simple, and less costly. This brings us down to the fact that any hinged control surface is more effective at high speed than at low speed. The usual dilemma is finding the rudder area and movement that enables you to steer the plane properly during the glide, without having to toss it about violently under power. Very often, the rudder area and setting that gives smooth power-on flight will not steer the ship adequately in the glide. In a wind it may fail to steer altogether during glide, even being incapable of holding the nose into the wind.

Rudder alone still has lots of possibili-

ties. Since with escapements we fear to use more rudder area and action, such maneuvers as Lazy-Eights, Immelmans and Chandelles remain out of the question—unless you have experience and develop a two-control, more elaborate machine (but most of us have to leave that to the Walker's). Escapements give you full rudder position on either side, this being limited by what the ship will take in normal turns. Proportional rudder control, giving rudder movement in proportion to a control stick on the ground, would permit maneuvers demanding strong rudder action. Rockwood recommends that his three-channel unit be used with one channel for right rudder, one for left, and the remaining one for motor control; an electric motor moves the rudder right or left, depending on the movement of the ground control key. Since this rudder control may be blipped as frequently as desired it affords the next best thing to proportional control. In the writer's opinion the self-neutralizing escapement is more suited than other escapements, being simpler to operate. It, too, permits a degree of blipping for rapid rudder movements in the same direction. True, it also passes through opposite rudder each time but requires only two jabs of the button for another quick blip as desired. Under pressure, the writer frequently has been aware of the limitations of the nonself-neutralizing escapement. If fitted with some sort of automatic ground control, such as described by Walt Good in his *Rudder Bug* article (June 1949 M.A.N.), this type of escapement may be operated fast enough for good maneuvers under all circumstances without mental confusion. Our own objections to this type of escapement are the same that lead Paul Johnson to develop a ground control device that permits choice of right or left rudder at will (see M.A.N. for July 1949 and May 1950). This makes a big difference in windy flying. On the other hand, self-neutralizing escapements that the writer has tried to use are light to the point of being impractical. More trouble results from super-light escapements and the insistence on the use of pen cells to work them than from the radio itself.

Excess thrust may be killed off with inefficient propellers. Increasing the diameter and blade area always is the wrong answer. With a 16" *Flo Torque*, the plane in Fig. 2 was flown with engine throttled back too far for smooth running, yet the ship still rocked over in a left bank. Reducing the prop to 14" resulted in straight flight, but the plane settled to the ground until the spark was advanced. The *Citizen* was fitted with 12" props cut down from 14" *Invaders* and was almost uncontrollable due to violent high-speed maneuvers with the .199. With an 11-6 *Powerprop*, forward speed was moderate although rpm's were higher. However when an .09 was installed on glow, the problem was reversed. More diameter and area was needed and the 10-4 *Tornado* prop gave best results. In the R.C. field, increased diameters and blade areas are better mated to large, slow ships, hence increase efficiency.

As to general design, it seems advisable to use some form of anti-stall wingtip, either by cutting away the underside of the tip ribs near the tip-trailing edge (*Rudder Bug*), washout (McElwee), or tip slots (Foxworthy). That tip slots do work, Foxworthy proved by taping over the slots on his ship, after which it dragged across the field without gaining altitude. When the tape was removed the plane climbed nicely on the same power. Doing something about tip stalls prevents the airplane falling off from a steep climb, or stalling a tip and turning off course during a slow glide, or sliding into the ground when slowed up in a turn close to the ground. Free flight models obtain the opposite effect with polyhedral tips which stall badly so that the machine rolls upright when inverted. Anti-stall tips also permit use of less dihedral. Speaking of dihedral, the plane in Fig. 1 had 10° but would not dive faster after ten turns of a spiral than it would after two. Plane 3 had 7° and will build up more speed, putting its nose down further as speed builds up. (There is increasing evidence that really tight spins frequently pass beyond recovery.)

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Ships with low profile areas appear to give better turn characteristics and some poor turning machines have been cured by adding a belly fin. Ships difficult to bring back in the wind often are improved by larger fin areas. Sufficient weathercocking is needed, without making the model into a true weathervane. A plane that keeps turning out of the wind on its own is almost impossible to control at a distance. Short moment arms decrease turn diameter, desirable on sport jobs in confined areas, while longer arms widen the turn. The long fuselage of Fig. 3 resulted in building up more velocity in wider spirals, and gradually tightening the turn, whereas the short-tailed job in Fig. 1 would quickly build up speed—but only to a point—in quick, tight spiral turns. The longer job is far easier to control in a wind, not losing its heading so easily.

High thrust lines have less nose up tendency under excess power and/or speed. The lower the thrust line the more down thrust required, especially when much thrust is used. Some builders invert their engines for this reason while others dispense with a cabin and place the wing on the fuselage top. Stabilizer areas of 25-30% seem sufficient. Prone to use of large stabs, the writer's ships balance at 50 to 60% of the chord, rather than at the usual 40%. The latter figure is considered more desirable. However, it is likely that this far-back balancing point is linked to the high wing loadings. It was noted that, at the same angle-of-attack, the balance point moved back on the chord for smaller ships, forward on the big ones. Similarly, with the same balancing point, in per cent of chord, more incidence had to be used on the smaller ships. Not only weight but small size influences the point of balance.

If some of these figures don't gibe with your own concepts, remember that it will take all kinds of radio control models to really find out what can be done. Those shown in the illustration are not meant to influence anyone, but merely point up samples of high loadings.

Push Rod

(*Continued from page 31*)

from 1/16" sheet. With the spar dried and properly sanded, cement the center section ribs in place. The ribs are inserted horizontally then twisted to the vertical position between the upper and lower as well as the rear spars. Cement in place the leading edge of 1/4" sq. balsa, and the trailing edge of 3/16" x 1/2". When completely dry, remove from plans and proceed with outer panels as you did with the center section. Secure the spars to the drawing, propping up the center section to relieve strain on spar butt joints, then cement ribs in place. The wingtips are made of 1/4" sheet, cut as shown and cemented in place.

With the wing drying, we turn once again to the now well-dried booms and rudder assembly. Sand both rudders to airfoil sections, finish with fine sandpaper and give two coats of clear dope. Starting from where they leave the trailing edge of the wing, rough sand the booms to shape; final sanding will be done after the wing center section is sheet covered. Our next step is to assemble the booms to the wing. Secure center section to work bench, notch trailing edge and booms as shown, then cement both between ribs W-1 and W-1, spacing the tail 2" high as measured from the flat lower camber of the wing.

With this assembly drying, you can start on the lifting stabilizer which carries a narrow Clark Y airfoil. Seven ribs are cut from 1/16" sheet; the two outer ribs are 1/8". Insert the 1/8" sq. spar, space the ribs as shown and cement to the notched trailing edge of 1/8" x 1/2" strip stock. The leading edge is cut from 1/4" sq. material. When dried, remove from plans, sand well, and cover with *Silkspan*. Spray the covering with water; when dry, apply two coats of clear dope.

While the wing and boom assembly is still secured to the bench, cement the finished stabilizer between the booms with a

(*Turn to page 53*)

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zero incidence setting. This operation is of importance and should be executed with extreme caution. With the wing still fast to the bench, sheet cover the areas shown, using 1/16" stock. When completely dried, sheet the underside. Add 1/32" x 1/8" cap strips, then sand wing and boom. At this point we add the fuselage-to-wing fairing which is cut from a block of balsa measuring 1" x 2-1/4" x 3". Cover wing with *Silkspan* and apply two coats of clear dope, booms included.

The last and final step in construction is the fuselage. You will note on the drawing that the author shows a *Bantam* mounting a plastic fuel tank. If a Methanol base fuel is used, the plastic fuel tank must be replaced with a metal one. Now for the fuselage. Select two pieces of 1/4" x 3" sheet of uniform bending qualities; these will form the fuselage crutch. Cut to shape shown and cement the motor mounts of 3/8" sq. hardwood along the lower rear portion of the crutch. Apply two to three coats of cement and allow ample drying time. The firewall is cut from 1/8" plywood, as shown in drawing cross section. The landing gear is bent from 1/16" wire and held to the firewall with heavy thread and cement. Cement the firewall and gear assembly in place, then attach the two center spacers of 3/16" x 1/2". This will give you the basic box shape of the fuselage. At this point, install the 1/8" sheet nose former as shown in top and side views. The nose wheel gear is bent of 1/16" wire and fastened to a piece of plywood measuring 1-9/16" x 2-1/8". Do not cement this assembly in place yet, and bend only the mounting end *not* the wheel end.

Select the three large fuselage blocks of even grain and proceed as follows: the lower rear block measuring 1-1/4" x 2-1/4" x 9" is fitted first. Notch this block so it will nest between the gear, and allow it to overhang the rear of the fuselage a small amount. Tack lightly in place with cement. The lower forward block measures 1-1/2" x 2-1/4" x 10" and is tacked in place with cement in the same manner as the rear block. The upper deck block measures 3/4" x 2-1/4" x 6-1/2"; cement this one lightly in place also. Now proceed with the carving and sanding, referring to the cross section shown on the drawing. Use rough sandpaper for the heavy work, then finish up with 00 sandpaper. When this operation is completed, apply two coats of clear dope, sanding after each coat. Now remove the three blocks and gouge out to a 1/4" wall thickness throughout. Cement the lower rear block in place first; next install the nose wheel assembly and apply several heavy coats of cement, as strength is a must with this installation. The nose wheel receives heavy landing shocks and must be built to last. When dried, cement two reinforcing braces of 1/4" sq. on fuselage as shown in the side view of drawing. With the nose wheel gear still straight, drill a 1/8" hole in the lower portion of the hollowed block where the gear comes through, cement this block to fuselage (don't spare the cement). Secure the top block and allow the assembly to dry.

Cut out formers A and B from 1/8" sheet and 3/16" sheet respectively, and cement in place. Cut the canopy former of 1/8" diameter reed and mount as shown, forcing the ends of the reed into the fuselage sides. Finish bending the nose wheel gear as shown in drawing. Cement nose block in place but do not hollow it.

The two air scoops are carved from blocks measuring 1" x 2-1/4" x 3". Before these scoops are cemented in place, cut out the air inlet holes in the fuselage just to the rear of the firewall. To complete the fuselage, drill a 1/4" hole through the sides and insert a 1/4" dowel for wing rubber.

The cowl is carved from a 3/4" x 2-1/4" x 4-1/2" balsa block, hollowed out, and is held in place with two dress snaps cemented securely. A final sanding is given the entire fuselage, followed by two coats of clear dope; this applies to cowl as well. The windshield and canopy enclosure is formed from .015 celluloid. Mark the cutouts for the exhaust and fuel-filling holes; when you have checked to be sure of your markings, cut the holes out. With this completed, *Push Rod* is ready for its final finishing.

The model is now ready to be doped to the colors desired by the model builder. The plane illustrated is doped blue with red booms and rudders, with a red stripe down the fuselage. The top portion forward of the windshield is painted anti-glare black for scale effect.

Eight feet of 1/8" flat rubber hold the wing in place, and a 10" diameter, 10" pitch *Supr-Scru* pusher prop propels the model. The ship alights on three 2-1/2" diameter *Trexler* balloon wheels. After a few glides with, and without power, the modeler should start in to thoroughly familiarize himself with *Push Rod* before taking hasty steps, which invariably result in a heap of scrap balsa. Good flying fellows!!!

Flash

(*Continued from page 7*)

steady passenger service for more than 20 years and are still in use today here in the United States? Air Tours, Inc., provides irregular air service with Ford *Tri-motors* between points in Ohio and along Lake Erie's shore and islands in the Lake. The service is available only during the summer and Air Tours, Inc., carries regular mail when it is available as an official "star" route for these isolated communities.

AUSTRALIA may become the first nation in the world with an all-jet air force. Australia is now in production on the DeHavilland *Vampire* Mk. 30 fighter-bomber, the Hawker N.7/46 shipboard fighter and the English Electric *Canberra* light bomber, all jet-powered aircraft.

SECRETARY JOHNSON has finally straightened out the complicated battle for guided missile research facilities—but probably only temporarily. The so-called "Joint Long Range Proving Ground" beginning at Banana River, Florida, and continuing Southeast for several hundred miles, has been turned over exclusively to the Air Force. The original idea for manage-

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No responsibility assumed for any omission or error

OCTOBER 1950 MODEL AIRPLANE NEWS

ment of this facility was a joint operation under the direction of the Joint Chiefs of Staff. The confused situation out in New Mexico has finally been settled by giving the U.S. Army complete jurisdiction of Holloman Air Force Base, White Sands Proving Ground, etc., except for the Atomic Energy Commission control of the Los Alamos facilities. The Navy continues in complete charge of the Point Mugu, California, testing facility.

SPEAKING OF the Banana River test range, reminds us of the radio and newspaper stories that preceded the recent firing of a V-2 missile over this range in its first test. Without exception, all of these news reports referred to the test as the "first horizontal firing of a V-2 weapon." We hardly think that the powerful V-2 was laid on its side and touched off! (We wouldn't care to have been within hundreds of miles of such an affair!) Actually, the missile was (and must be) fired at an angle of 45-60° and when its own fuel was exhausted after burning about 5 mins., it has reached an altitude of 30-50 miles and a distance of 50 miles or so. At this point a *WAC Corporal* small missile in its nose is fired, and this weapon continues at a shallow angle for a distance of 150-200 miles, depending on how well everything works. The real lesson here is two-fold: (1) We are still working with captured Nazi V-2 missiles as the best available about *seven years* after they were first tested, and (2) How pitifully short is the range of even this jury-rigged test missile. It seems rather alarming that after five years of very, very expensive research, development and test (not to mention publicity stories!) of so-called "guided missiles," that this is as far as we have gotten! The only comfort lies in the assumption (or hope!) that no one else has gotten any further in their work; this means that for the time being, at least, the world is safe from the long-range atomic guided missile attacks the newspapers have been scaring us with.

THE AIR LINES always seem to take plenty of time making up their minds about the purchase of new airplanes—but then they can't wait to get their hands on them! TWA waited about five years before it finally selected the Martin 4-0-4 as the twin-engine replacement for its DC-3 transports. That's a mighty long time to keep the manufacturers waiting. But then TWA couldn't wait to get its hands on the airplanes and agreed to accept 12 "old-fashioned" model 2-0-2 air liners for which Martin had assemblies on hand. The first of these has now gone into service on a lease arrangement. Now comes Capital Airlines, who also waited four or five years before ordering the Super DC-3. Impatient to get the airplane certificated and in service, Capital has finally wangled the actual prototype airplane from Douglas on a loan basis while it conducts its proving runs and flight crew training for the necessary Civil Aeronautics Administration approval. When the first Super DC-3 delivery is made, Capital will then be able to simply sweep out the floor, taxi to the loading ramp, open the door and take its first passengers aboard.

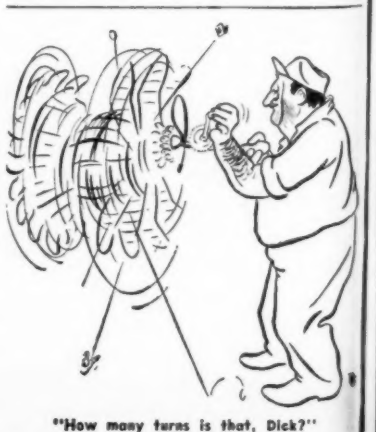
ONE OF THE toughest legal problems in the world is the question: "How much is a human life worth?" We wouldn't sit in the judge's chair facing that problem for anything in the world. Many states have set maximum amounts on such questions, such as $10,000 in Connecticut and Virginia, and that greatly simplifies a judge's problem. But that doesn't seem like much money for the loss of a loved one. That decision had to be made recently when the widow of the TWA navigator, who was sucked out of the astrodome of a *Constellation* on a recent trans-Atlantic flight, sued the air line for damages. U. S. District Court in Vermont awarded her a total of $67,500 in settlement of her claim on the theory that the astrodome was insufficiently strong and improperly fastened, making it negligence on the part of the air line (which will probably sue Lockheed as a result).

THE MONSTER Convair XC-99 six-engined transport is back in the air again after a whole year of hard luck. The giant cargo-counterpart of the B-36 bomber, was flown to Kelly Air Force Base, Texas, about a year ago to have its engines changed from 3,000 to 3,500 horsepower Pratt & Whitney R-4360 *Wasp Major* types. During the course of the work, a static electricity discharge explosion in one of the port wing fuel tanks nearly wrecked the wing and extensive repairs were required. Now the modification work has been completed and the giant 150-ton air liner, which can carry 400 fully-equipped infantrymen, is back in the air performing flight tests to see how much the added power improves its performance. The huge craft can carry 100,000 pounds of cargo for 4,000 miles!

IF YOU THINK the Bell X-1 was fast . . . wait until the Bell X-2 tries its wings. You will recall that the X-1 has hit about 1,000 mph on its 6,000 lbs. of thrust. Well, the X-2 has swept wings (which makes an airplane one-third faster) and its new Curtiss Propeller Division rocket engine will have a thrust of 15,000 lbs., almost three times as much as the X-1. Engineers confidently predict a speed of at least 2,000 mph out of the new research plane, which has been under development for five years. At that speed you could leave New York at 12 Noon and arrive in San Francisco at about 10:15 that same morning!

THE SWISS Air Force recently grounded all of their newly-bought DeHavilland *Vampire* jet fighters for "faulty parts," but DeHavilland engineers think the whole thing was political with a lot of Swiss professional pride thrown in. There are no workmen in the world more jealous of their reputation as fine machine craftsmen and a "Swiss watch" is a world-wide symbol of technical excellence. Swiss machinists, taking the Vampire's *Goblin* engine apart, discovered that the accessory gear wheels hadn't been ground to a fine enough finish and all airplanes were grounded until these gearwheels could be removed and ground to the close tolerances demanded by Swiss pride. The gearwheels have met all tests according to British standards and have held up well in service all over the world. When one nation buys another nation's airplanes, there is always created a slight jealousy on the part of the purchasing nation's own aircraft industry. Maybe the regrinding of these gear wheels will give the Swiss technicians just that measure of "setting things right" that will appease their pride and render the *Vampire* acceptable.

A LOT OF "weak" stories are bolstered up by claiming they actually happened but we swear this one is true. During the recent Marine Air Reserve Maneuvers in which Reserve squadrons from West of the Mississippi assembled at Cherry Point, North Carolina, a pilot from the Minneapolis squadron flying a Vought *Corsair* fighter ran into engine trouble over Lone Rock, Wisconsin, and radioed the field for an emergency landing. The radio operator at the field solemnly called back: "Do not land here. We have no engine mechanic on duty!"



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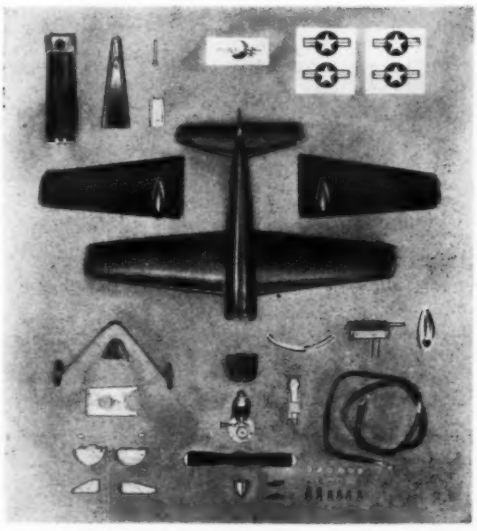

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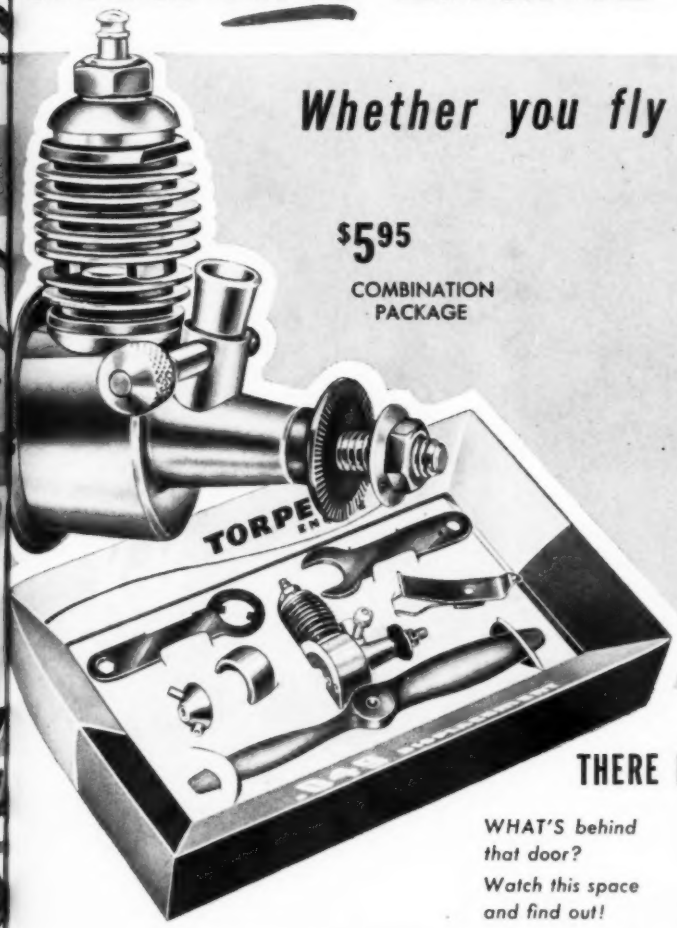

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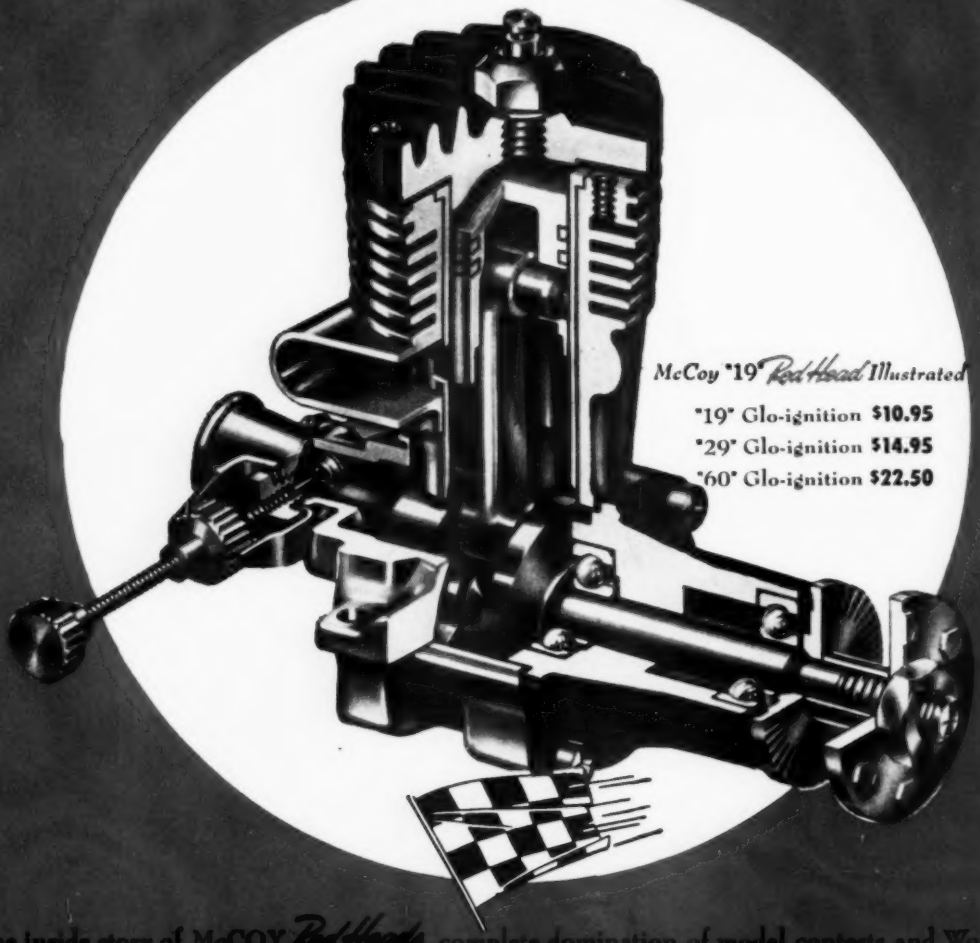

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